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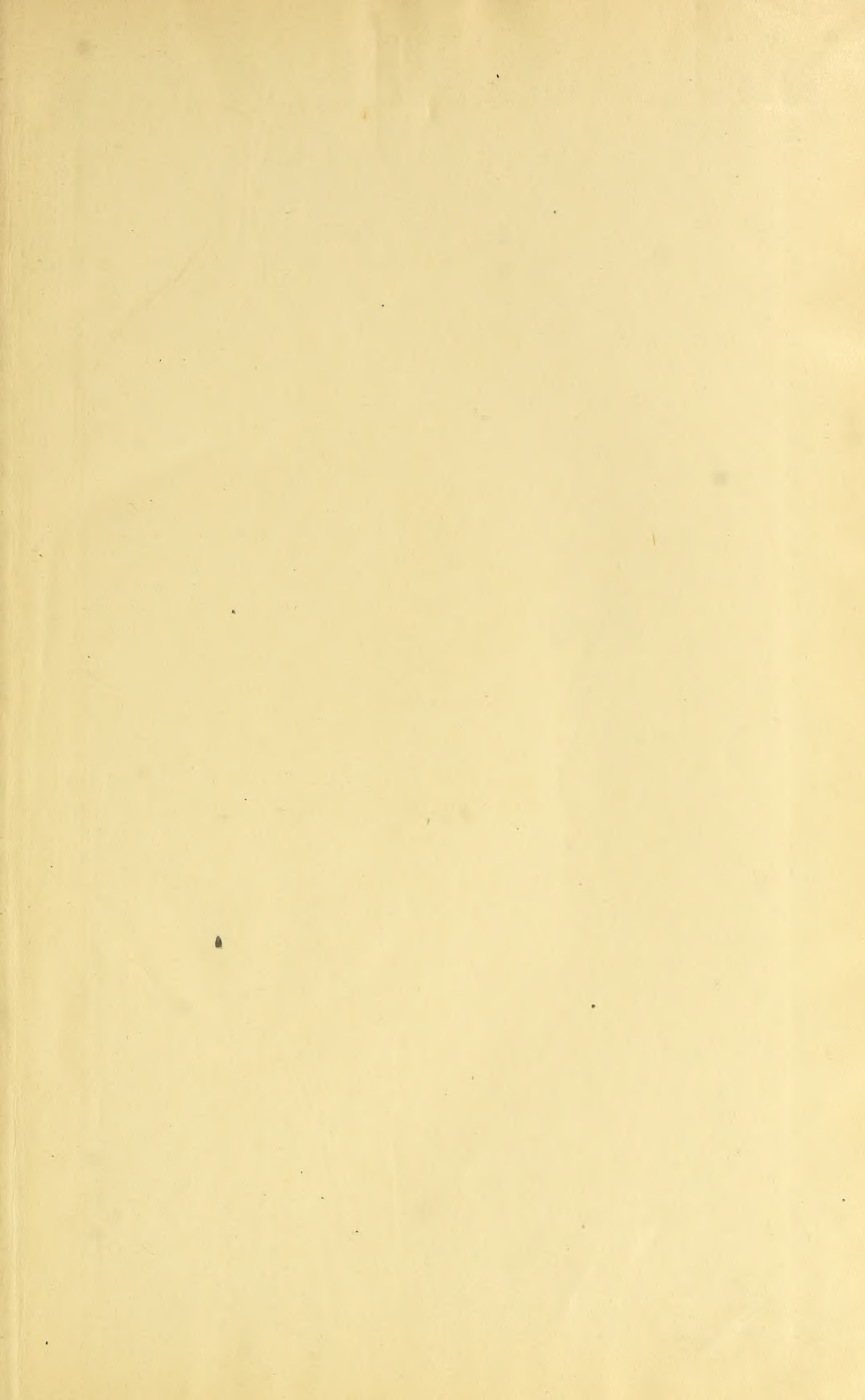
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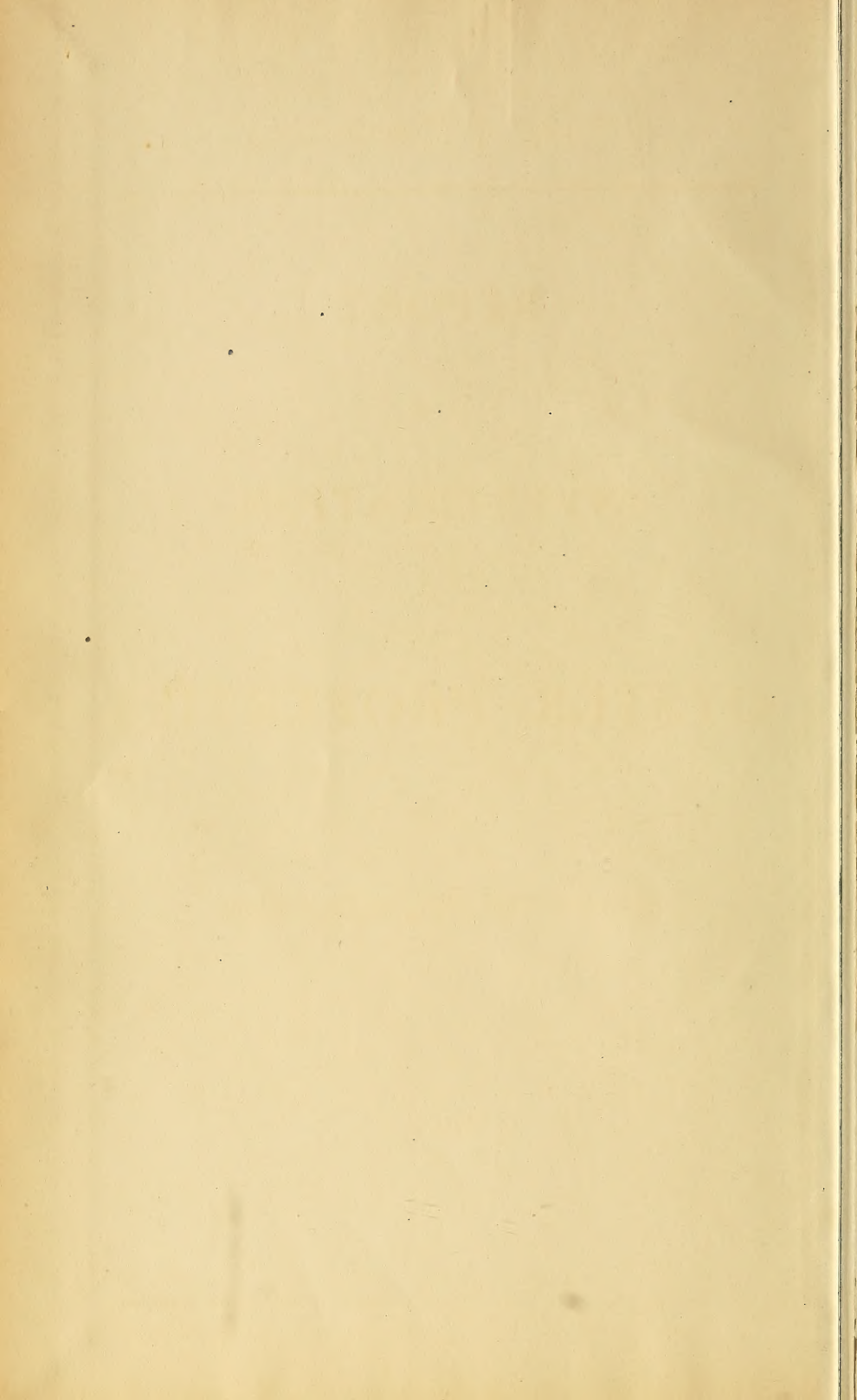


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1910





State of Connecticut

REPORT

OF THE

INVESTIGATION

OF

OYSTER PROPERTIES

BY THE

BOARD OF EQUALIZATION

1910

State of Connecticut
PUBLIC DOCUMENT—SPECIAL

REPORT
OF THE
INVESTIGATION
OF
OYSTER PROPERTIES
OF THE STATE

138
429

BY THE
connecticut. BOARD OF EQUALIZATION and oyster
investigation commission
AS A

Special Commission appointed by the General Assembly of 1909,
Special Law 486.

REPORT PRESENTED TO THE GENERAL ASSEMBLY OF 1911.



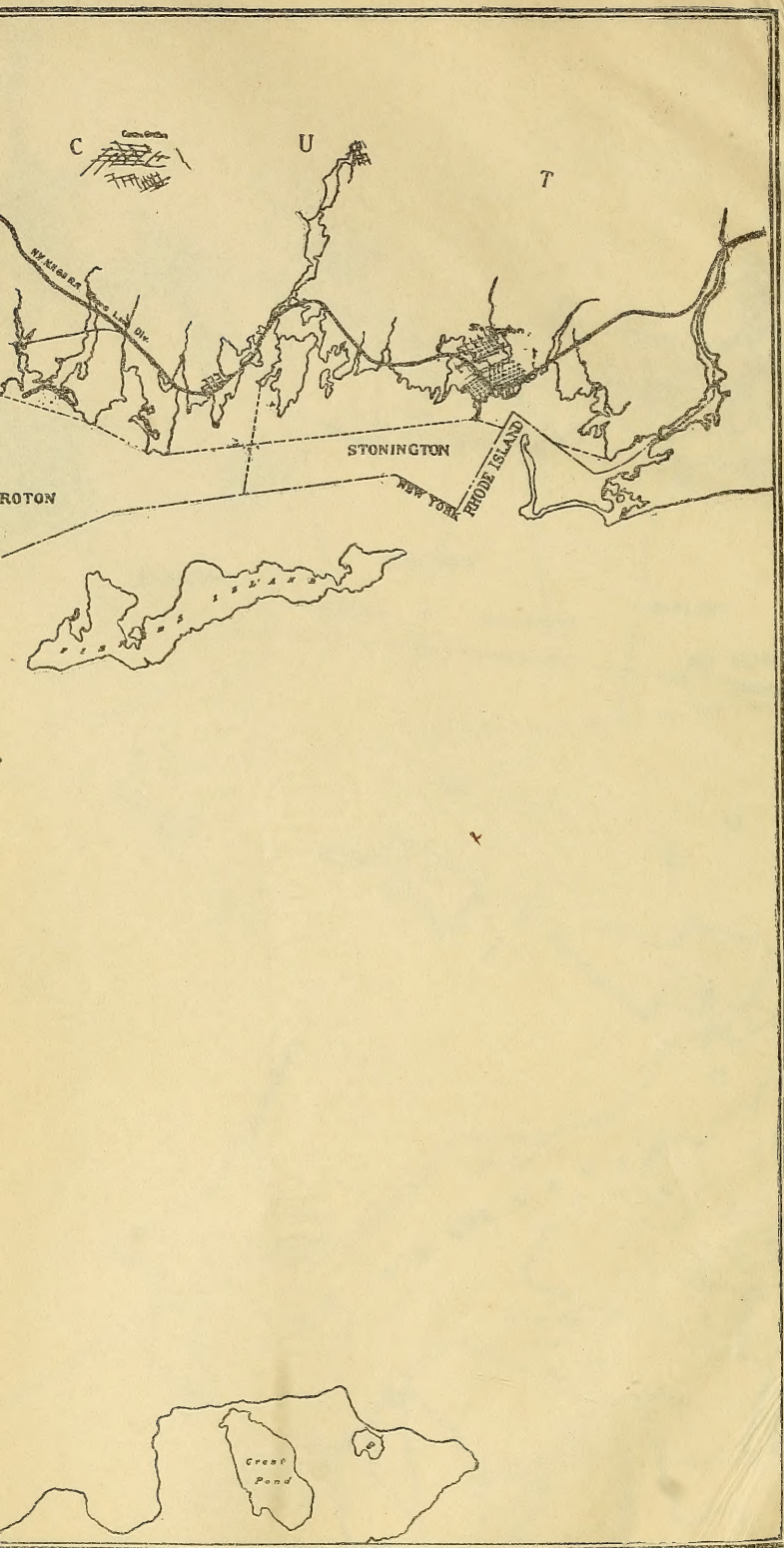
HARTFORD
PUBLISHED BY THE STATE
1910

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PUBLICATION
APPROVED BY
THE BOARD OF CONTROL.

MAR 16 1911
D. OF A.





State of Connecticut.

Freeman F. Patten,
Treasurer,
Thomas D. Bradstreet,
Comptroller,
William H. Corbin,
Tax Commissioner.

BOARD OF EQUALIZATION AND OYSTER INVESTIGATION COMMISSION.

HARTFORD, December 28, 1910.

To the Members of the General Assembly:

The State Board of Equalization, which was appointed by the General Assembly of 1909 under Special Law No. 486 as a commission to investigate the oyster properties of the State, submits the following report:

Before giving in detail an outline of the methods of its investigation, it seems desirable to present a brief history of the development of the oyster industry in Connecticut so that the members of the General Assembly who are not familiar with the subject may be sufficiently informed before considering the detailed statement of the Board, and its recommendations for definite changes in the existing statutes.



HISTORY OF THE OYSTER INDUSTRY IN CONNECTICUT.

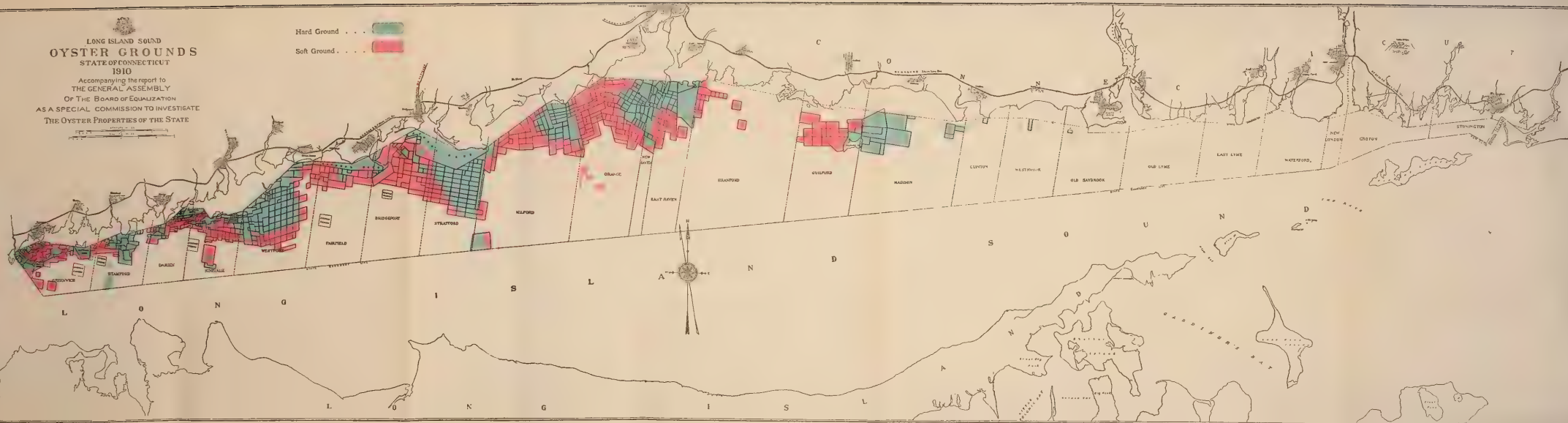
The historical sketch given herewith is practically that which was prepared by Mr. James P. Bogart, formerly engineer of the Connecticut Shell-Fish Commission, and published in the fifth annual report of the Bureau of Labor Statistics, for the year 1889.

"The rivers of Connecticut have been productive of natural growth oysters from time immemorial. Cultivation of oysters in the harbors began about 1845, and deep water planting in the Sound about 1870. To-day nearly all the legally available ground for oyster planting in the rivers, harbors, and bays has been designated, or deeded to private ownership, and in addition we have a great system of more or less productive deep water oyster farms stretching for miles from the shores and extending in an almost unbroken line from Greenwich to Branford, an air-line

LONG ISLAND SOUND
OYSTER GROUNDS
STATE OF CONNECTICUT
1910

Accompanying the report to
THE GENERAL ASSEMBLY
OF THE BOARD OF EQUALIZATION
AS A SPECIAL COMMISSION TO INVESTIGATE
THE OYSTER PROPERTIES OF THE STATE

Hard Ground . . . 
Soft Ground . . . 



distance of forty-five miles, and again off Guilford and Madison, a distance of seven miles. These submerged farms are covered by thirty to seventy feet of water.

THE FIRST VESTED RIGHTS.

"Connecticut was the first State to grant vested rights in oyster ground and the unrestricted enjoyment thereof. The growth of her industry justifies the policy pursued. Legislation which assured this policy was slow and not always attended with good feeling. In 1842 it became lawful thereafter for the owner or owners of any land in this State, wherein there may be salt water, creeks, or inlets, to dam, gate, or lock the said creek or inlet, for his or their use, for an oyster pond for the growing of oysters therein. But this privilege might only be obtained under conditions which rendered it almost certain to prevent any person from enjoying a benefit from the provisions of the law.

THE PRIVILEGE OF TRANSPLANTING.

"In 1845 it was made lawful for any inhabitant of this State, under certain limitations and restrictions, to lay down or plant in any of its navigable waters, any oysters brought from any place beyond the limits of the State. In 1846 the provisions of the act relative to the laying down of oysters were extended so as to cover any oysters brought from any place within the limits of the State.

A STATE RESIDENCE REQUIRED.

"In 1848 it was made unlawful for any person who is not at the time an actual inhabitant or resident of this State, and who has not been for six months next preceding an actual inhabitant or resident as aforesaid, to take, rake, or gather any oysters, either on his own account or benefit, or on account or benefit of any employer, in any of the rivers, bays, or waters of this State on board of any canoe, flat, scow, skiff, boat, or vessel.

THE TWO-ACRE LAW.

"In 1855 the law known as the two-acre law was passed. It provided that towns might appoint a committee not exceeding five in number, who may, if the public interest requires, designate to any person desiring to plant oysters an area not exceeding two acres in extent. The law provided that if any man got more than two acres for speculation or by assigning his rights for profit he should forfeit and pay for each offense the sum of fifty dollars. Limited areas of ground had been in use for some years prior to 1855, and the law provided that occupants should be allowed to retain these grounds on their compliance with the law within a fixed time.

"At the time of the passage of the two-acre law the present ideas as to extensive cultivation did not prevail. Indeed, it was thought that two acres was all that one man could attend to. For ten years after the passage of the law the cultivation of oyster ground was confined to the rivers and harbors of the State, and areas inside of the Norwalk Islands. In 1865 offshore planting in twenty to twenty-five feet of water, at low water, began between Fish Island and Norwalk Islands. In 1870 planting offshore in thirty feet and over began outside of the Norwalk Islands, and was followed a few years later by deep water planting outside of New Haven Harbor.

"In 1864 the property in the claims set out in accordance with the provisions of the acts of 1855 and 1864, was made liable to assessment and taxation in the towns where such claims were situated, in the same manner as other property.

ESTABLISHING A STATE COMMISSION.

"The influx of capital into the industry and the demand for greater security of tenure led in 1881 to the passage of an act establishing a State Commission for the designation of oyster grounds. The execution of the provisions of the act was entrusted to a board of commissioners of shell-fisheries. In 1889 radical changes were made in the law regulating the offshore fisheries.

CONTESTS AT THE CAPITOL.

"No mention has been made of the contests waged at the Capitol relative to the use of steam, and the final adoption of laws which make it lawful for a man to dredge with steam on his private property, between the hours of sunrise and sunset, but make it unlawful to dredge with steam on the natural beds. All legislation affecting oyster interests has been vigorously contested. Many laws were enacted to meet individual necessities. Some of these would have been admirable if the designation of oyster grounds from the outset had been regulated by methods which would have insured to the owners accurate town records respecting the location of their grounds.

STATE MAP WORK.

"For preliminary map work, the State has used three methods of procedure in dealing with the offshore town designations of oyster grounds. 1. Grounds that had not been occupied, but having records that were capable of being construed, were placed on the state maps in accordance with the construction that best satisfied the general intent. 2. Grounds that were occupied, and the positions of which were indeterminate by record, or capable

of holding many positions by record, were mapped in accordance with the understandings of the claimants, thus keeping the claimants apart till legal adjustments of their rights could be effected. 3. Grounds occupied or unoccupied, having records free from inherent discord, were mapped in strict conformity with said records. Prior to 1881, planters would oftentimes, with the consent of the town oyster ground committee, experiment on ground for several years before taking out designation papers.

"The maps and records made by the State Shell-Fish Commission are calculated to stand the tests that they are liable to be subjected to. At the outset, the coöperation of the United States Coast and Geodetic Survey was secured. An outfit of instruments and tools adequate for the work was bought. Proper signal stations were built on the hills and along the coast, as far east as the Connecticut River, and these, together with the light-houses, church spires, and numerous other suitable objects, were accurately located by a bold system of triangulation work, thus securing the truth as a base from which to start the map work. The corners of offshore lots were marked by buoys of cedar spars or scantling, say thirty feet in length, anchored by stones weighing one to two ^{hundred} pounds.

DEVELOPMENT OF THE OYSTER.

"Oysters are male and female at spawning time, but at no other time; the male appears at the proper season in numbers equal to the female, whose possible eggs are estimated at sixty millions. But the waste is very great. Unless fertilization is immediate, the sea water destroys the eggs and the comparatively few that reach embryonic stage and swim about at the surface of the water for a day or two, are decimated by fish, perhaps by the jelly-like young of the star, while cold rains and winds are equally destructive. The surviving embryo descends and fastens itself to any smooth clean surface by exuding a cement, and is then called 'spat.' But its danger, though much reduced, is still great; crabs, carnivorous gasteropods, and various fish eat it, and such a multitude settle in the same vicinity, that when they grow they crowd each other to death. Few survive to feed on algæ and to make their shells of the carbonate of lime. If they have adhered to a soft bottom they grow fast but long and thin, 'shanghai's' they are called, and are, as soon as circumstances permit, transplanted; if they settle upon hard and gravelly bed they enlarge more slowly, but in a round and handsome way. After two years they are knocked apart and transplanted. Another year brings them to the 'culls' stage, or they are sold as seed; the fourth finds them, in the language of the market, 'boxes' and the fifth 'extras.' All this while they have been suffering from star-fish, the drills, the winkles, storms,

and mud. In a short time a whole colony will be wiped out by the insidious 'five fingers' in his insatiable search for food.

CULTIVATION.

"The system of Sound planting, or more properly deep water oyster farming, is quite complicated. It began in 1865 in water twenty to twenty-five feet in depth, between Fish Island and Norwalk Islands. In 1870 the planting began outside of the Norwalk Islands and a few years later off New Haven Harbor. The planting consists in the strewing of three or four hundred bushels of oyster shells, and thirty to forty bushels of mature oysters to the acre, in order that they may settle on suitable bottom. This is done in the months of July and August. The planting of the old oysters is often omitted when adjoining beds are likely to furnish spat for the new bed or in the case of renewal of an old bed. Experiments have been made with crushed blue stone. Gravel has also been sown. The spat will adhere to anything that is clean; even old rubber boots have been dredged up with a thriving colony attached. If there is no spat, the shells or other material must be dredged up to be dried on the docks for use the following season. If permitted to remain under water they become slimy and therefore useless. After the beds are prepared the planter is kept busy watching for the star-fish and dredging for them; he is also stirring up his beds at the proper times. Then comes the dredging and the sale of seed oysters, the sales for market and for export with the attendant opening, if the planter indulges in the shucking trade. The successful planters are at work the year round, for it is in this as in other occupations—to well-directed industry nothing is denied.

"Cultivation has been extended to bottoms which have been thought unfit owing to softness or other causes. This has necessitated the devising of dredges of peculiar construction to meet special cases, and the acquirement of great skill in their use. If such were not the case, many crops would not be gathered. Several kinds of dredges have been patented which are expressly designed to catch star-fish. Some of these catch only star-fish and other light animals, and do not disturb the oysters."

An oyster grower, who has been in the oyster business more than forty years and his father before him, has given the following statement of the methods and conditions based on his recollection and experience:

EARLY METHODS.

"The oyster cultivation previous to 1870 was almost entirely inside of what is now the line between town and State. There were some grounds in what are now state waters, off New Haven,

south of the Old Lighthouse, and some off Greenwich. The principal places in Connecticut up to that time, where oysters were planted, were New Haven, Bridgeport, Norwalk, Darien, Stamford, and Greenwich. Large quantities of southern oysters were brought in schooners and planted at New Haven each spring to be used through the summer and early fall. The oysters were taken up in small boats with oyster tongs, or oyster rakes, and by hand dredges. They were towed by sailboats to Fair Haven, where they were opened and shipped in small kegs all over the country. South Norwalk shipped mostly to New York in barrels the oysters that were raised near Greenwich, Stamford, Darien, and the Norwalk Islands. In the seventies a trade started up in England for the American oyster. There was a small demand at first, but it gradually increased until as high as 160,000 barrels were shipped in a season. The oysters were sent there in the spring and laid down on beds to be used through the summer months when their native oysters were not allowed to be sold. But as the American oysters were laid down in shallow water near some of the large cities where they would be exposed at low tide, the Board of Health finally prohibited the use of these beds, as being dangerous to health, thus cutting down the importing of the American oysters from 160,000 barrels to about 20,000 barrels. As but few beds could be found where oysters were not exposed to the danger of losing them by storms, a large opening for Connecticut oysters was cut off.

EXPERIMENTS.

"The first steamer built for the oyster trade was in 1877 at South Norwalk, and in a few years there was quite a number which made it possible to cultivate oysters in the deep waters of Long Island Sound. When the first grounds were taken up in the Sound under the state law which we have now, the oystermen were allowed five years to give the ground a trial, and if found to be unfit for oyster cultivation, they could deed back to the State at any time inside of the five years such grounds. The State would then refund the money less ten cents per acre, which went for cost of surveying the grounds in the first place. That was, as may be seen, in the nature of an experiment, as thousands of acres were found unfit for oyster cultivation, and the oystermen were out thousands of dollars by the experiment.

"As it takes from four to five years to mature oysters, the dangers from storms which bury them so that they are smothered in the sand or mud as the case may be, from star-fish and drills which destroy millions of young oysters every season, are much greater than to the farmer's crop, which matures every year. The farmer has the advantage of being able to walk over his land every day, whereas the oysterman can only go over

his grounds and try them with dredges here and there. In this way it is quite easy to miss a body of star-fish on a long piece of ground. The drills are so small that not much can be done to catch them, except to keep the grounds well dredged with the netting inside the dredge.

"The principal outlet for our oysters to-day is in bulk, opened and shipped all through the West, even to the Pacific coast. Large quantities are shipped in the shells as far west as St. Louis and Chicago, and some even farther west."

INSPECTION TRIP.

On September 30, 1909, the Board of Equalization and Governor Weeks went to Bridgeport, and met the members of the Shell-Fish Commission and Mr. Perry, the clerk, and accompanied them on their annual tour of inspection of the oyster beds of the State. The Board's trip extended west as far as Stamford with a landing at night at New Haven.

Opportunity was given to inspect the more important of the natural beds, together with the nature of the bottom and product of a large number of the grounds held under state franchises. Captain A. W. Halsey, who had charge of the boat, extended every possible courtesy and used every endeavor and opportunity to explain in detail the practical features of the oyster-growing business. The steam dredge was continuously used for the purposes of showing the different kinds of bottom, oysters in all stages of growth, together with the oyster enemies, the winkle, drill, and star-fish. The dangers to the industry which arise from storms, varying depth of water, sand bars, depredations, and government dredging were also pointed out. The method of hardening muddy ground by depositing on the same sand or other hardening substances, and the process of shelling the ground for the purpose of catching the spawn for the annual set, if any, were also explained.

A similar trip was taken September 22, 1910.

ATTORNEY-GENERAL'S OPINION.

As the powers of the Board in making the investigations were questioned, the following opinion was received from Attorney-General Holcomb relative to the same:

HARTFORD, Sept. 14, 1909.

HON. WILLIAM H. CORBIN,

Tax Commissioner.

SIR:—I have received your letter reading as follows:

'Enclosed herewith find copy of the resolution appointing the Board of Equalization as a special commission to investigate the oyster properties in this State. Will you kindly give said Board your opinion relative to its powers in connection with the oyster lands under the jurisdiction of the State and leased perpetually to individuals?

'Does said board have power to inquire into the annual product taken from such oyster lands by individuals and corporations who hold perpetual franchise of such lands which are under the State's jurisdiction?

'If said Board has not the power to inquire into the production, revenue, and protection of such lands as stated in the first part of section 1, would it have the power to secure information relative to the revenue and production in connection with the taxation of such properties owned by individuals, etc., as provided for in the latter part of section 1?

'Would the power to produce papers, books, etc., as provided for in section 2, include the power to secure information relative to the annual production and revenue received from oyster lands by individuals and corporations?'

The resolution referred to is No. 486 of the Special Laws of 1909, entitled:

"Authorizing the Governor to appoint a Commission to investigate the taxation of Oyster Properties,"

and reads as follows:

RESOLVED BY THIS ASSEMBLY:

Sec. 1. That the State Board of Equalization be and is hereby appointed a commission to investigate the oyster properties owned by the State, the production thereof, the revenue received therefrom, trespasses committed thereon, the protection provided therefor, and all things pertaining to the general care and management thereof, and the matter of the valuation and taxation of such properties in this State owned by individuals, firms, and corporations, which commission shall report its finding and recommendations thereon to the next session of the General Assembly.

Sec. 2. Said commission is hereby authorized to compel, by subpoena and capias issued by any member of said commission or other proper authority, the attendance of any person before it as a witness, and to administer oaths and to cause the production of any papers, books, or maps necessary for the purposes herein provided for, and to punish for contempt to the same extent as justices of the peace in criminal cases.

Sec. 3. The sum of three thousand dollars, or so much thereof as may be necessary, is hereby appropriated to be paid out of any money in the treasury not otherwise appropriated, for the actual expenses incurred by the said commission in performing the duties herein required.

Sec. 4. Said Board of Equalization shall have and exercise with reference to said oyster grounds, the power of a board of

relief, and such powers shall not be exercised by the Shell-Fish Commission until the rising of the General Assembly at the 1911 session thereof. And any person claiming to be aggrieved by any order of said Board of Equalization in the exercise of its powers as a board of relief may appeal to the superior court, in the same manner as appeals now lie from the board of relief.

The State has exclusive jurisdiction over the territory covered by the waters of Long Island Sound and its tributaries bounded north by lines drawn between certain designated points along the Connecticut shore, westerly and southerly by the State of New York, and easterly by the State of Rhode Island. (General Statutes, Sec. 3213.)

A portion of this territory consists of what are called "natural oyster beds" which are designated in Sec. 3114 of the General Statutes, which I understand to be territory where oysters and clams are self-propagating to an extent which makes the gathering of them profitable. The Shell-Fish Commissioners are authorized to grant licenses to persons to collect oysters and clams on these natural beds for a term expiring on the next succeeding twentieth day of July (Sec. 3234, General Statutes, as amended by Chap. 132, Public Acts of 1907). There are statutory provisions for the protection of these natural beds, to prevent persons trespassing thereon, and regulating the method of gathering oysters from said beds by those holding such licenses.

The balance of said territory, or a certain portion thereof, is adapted to the profitable cultivation of shell-fish by planting and cultivation. As to this territory the Shell-Fish Commissioners are empowered in the manner and under the conditions provided by statute, in the name and on behalf of the State, to grant by written instruments, for the purpose of planting and cultivating shell-fish, perpetual franchises in undesignated portions of said territory, to qualified applicants therefor. (Sec. 3215, General Statutes as amended by chapter 66, Public Acts of 1907.)

Such lands so granted are taxable against the owners of said franchises in the manner provided in Sec. 3226, 3227, and 3228 of the General Statutes, as amended by chapter 148 of the Public Acts of 1907.

On January 6, 1909, Governor Woodruff presented a communication to the General Assembly calling attention to the undervaluation and taxation of the properties covered by these franchises, and suggesting the appointment of a committee to investigate the subject, and to report what action, if any, the State ought to take regarding it. Subsequently the late Governor Lilley presented a communication to the General Assembly recommending that a commission be appointed to investigate and report upon the taxation of such properties.

In response to these recommendations the resolution above quoted was adopted, and in section 1 thereof, the Board of Equali-

zation was appointed as such commission, and was therein empowered to investigate the valuation and taxation of the properties in which perpetual franchises have been granted to, and which are owned by individuals, firms, or corporations.

To make such investigation effective section 2 of the resolution authorizes the commission to issue subpoena and capias, and to compel the production of any papers, books, or maps necessary for the purposes mentioned in section 1.

It is probable that the properties covered by these franchises are not of uniform value per acre. Some sections of the territory are doubtless more productive than others. The value of the several properties depends upon their productiveness. The financial returns which the several properties yield to the owners is a very important element in determining the value thereof. In this State the rule of valuation for taxation is the true and just value of any property.

In my opinion your commission is fully empowered by said resolution to ascertain the production and revenues derived from the properties covered by these franchises, and to compel any information by witnesses, books, or papers which will enable you to determine what is the true and just value of all properties mentioned in section 1 of said resolution.

Respectfully submitted,

M. H. HOLCOMB, *Attorney-General*.

REQUEST FOR INFORMATION FROM PRIVATE GROWERS.

To secure specific information relative to the total and cultivatable acreage, character of the ground, and approximate production of each lot, held under perpetual franchise from the State, the following letter and blank was sent to each holder of such ground:

HARTFORD, October 7, 1909.

DEAR SIR:—Pursuant to a resolution passed by the General Assembly of 1909, entitled a "Commission to Investigate the Taxation of Oyster Properties," Special Laws No. 486, enclosed herewith find blank requesting certain information relative to oyster properties in this State owned by you.

You are respectfully requested to make complete return of all such properties, answering in detail the question on the blank. If the amount of your holdings requires the use of additional blanks, the same will be sent on request. The information given will not be made public.

The return, made in proper form, and duly sworn to, should be sent to the Tax Commissioner on or before October 30, 1909.

The careful filling out of the entire blank in the form indicated, will greatly facilitate the work of investigation, and will

result in your convenience by making it unnecessary to summon you before the Commission in person.

Your truly,

FREEMAN F. PATTEN,
THOMAS D. BRADSTREET,
WILLIAM H. CORBIN,
*Board of Equalization and Oyster
Investigation Commission.*

STATE OF CONNECTICUT
Return to the State Board of Equalization

OYSTER PROPERTIES

Return of..... *Sheet No.*.....
Town of....., *Conn.*

Request for this information authorized in

SPECIAL LAWS NO. 486, SESSION OF 1909.

Section 1. That the state board of equalization be and is hereby appointed a commission to investigate the oyster properties owned by the state, the production thereof, the revenue received therefrom, trespasses committed thereon, the protection provided therefor, and all things pertaining to the general care and management thereof, and the matter of the valuation and taxation of such properties in this state owned by individuals, firms and corporations, which commission shall report its findings and recommendations thereon to the next session of the general assembly.

Sec. 2. Said commission is hereby authorized to compel, by subpoena or *capias* issued by any member of said commission or other proper authority, the attendance of any person before it as a witness, and to administer oaths and to cause the production of any papers, books, or maps necessary for the purposes herein provided for, and to punish for contempt to the same extent as justices of the peace may in criminal cases.

Sec. 3. The sum of three thousand dollars or so much thereof as may be necessary, is hereby appropriated to be paid out of any money in the treasury not otherwise appropriated, for the actual expenses incurred by the said commission in performing the duties herein required.

Sec. 4. Said board of equalization shall have and exercise, with reference to said oyster grounds, the powers of a board of relief, and such powers shall not be exercised by the shell-fish commission until the rising of the general assembly at the 1911 session thereof. Any person claiming to be aggrieved by any order of said board of equalization in the exercise of its powers as a board of relief may appeal to the superior court, in the same manner as appeals now lie from the board of relief.

EXPLANATORY NOTES.

Contents of this blank will not be made public.

Cultivable means capable of cultivation and not necessarily at present under cultivation.

Arrange the lots in groups as covered by mortgages.

The figures as to bushels may be estimates of the manager, if precise information is not available.

Individual owners must personally sign and make oath to each sheet.

If ground is owned by a corporation, the president, manager, or other duly authorized official sufficiently familiar with the details should fill out the blank.

Under "Value per acre" give amount you would be willing to sell for, or fair market value, not at forced sale.

Under "Character of bottom" state whether hard, medium, sticky, or mud.

In giving age of stock, state whether one, two, three, or four years old, etc., or new set, as the case may be.

Lots in Quinnipiac River section:

Tomlinsons Bridge to Ferry Street Bridge, west side, designate Q. R. A., with number.

North from Tomlinsons Bridge, east side, designate Q. R. B. with number.

Ferry Street Bridge to Grand Avenue Bridge, west side, designate Q. R. C., with number.

North of Grand Avenue Bridge, west side, designate Q. R. D., with number.

Lots in the West River section:

North of Kimberly Avenue Bridge, New Haven, designate W. R. A., with number.

South of Kimberly Avenue Bridge, New Haven, designate W. R. B., with number.

North of Kimberly Avenue Bridge, Orange, designate W. R. C., with number.

South of Kimberly Avenue Bridge, Orange, designate W. R. D., with number.

Explanations and remarks are invited and may be written on the back of this sheet.

Oyster properties of....., Town of.....Conn. Sheet No.....

Town. Lot.	Total acreage. No. of acres.	Cultivat- able. Value per acre. \$	Total mortgage if any. \$	Oysters at present on beds. Bushels. Age.	Oysters sold or transferred to other beds outside the State in the past five years.					Character of bottom and other comments on the nature of the lot.
					1900 to date.	1908	1907	1906	1905	
					Bushels. Age.	Bushels. Age.	Bushels. Age.	Bushels. Age.	Bushels. Age.	

Does your system of bookkeeping include a separate account with each lot to show profit or loss?.....

Can you show exactly or approximately the cost per bushel of the product of each lot?.....

Do you keep an account of the number of bushels produced by lot, either for sale or transfer?

.....
Signature and title of person who makes the return.

Date,.....1909.

State of Connecticut }
 County of..... } ss.

Personally appeared the above named and made oath to the truth of the above statement by him subscribed and of the matters therein contained according to the best of his knowledge, information, and belief.

.....*Notary Public.*

The Board of Equalization desires to give the matter careful study and consideration, and to that end would respectfully request suggestions on the following subjects:

Protection:

Trespass:

Contamination:

Changes in the laws relative to any phase of the oyster industry:

Reports giving the desired information in proper form were received promptly from many of the oyster growers, including some of the larger growers, but several failed to conform to the Board's request. Many reports were received which were not complete and apparently not made in good faith. After considerable correspondence with some of the largest oyster growers the reports requested were finally secured from all but one.

While the questions were all answered, the bushel figures given by certain growers in their report were not even approximately in amount those which the same had used in booklets and published statements for advertising purposes.

STATISTICS FROM THE REPORTS OF THE PRIVATE GROWERS.

Reports were received from two hundred forty-seven owners of oyster ground franchises in state jurisdiction. The total acreage of ground held under such franchises was reported to be 70,855.17 acres. The portion of this acreage reported to be sufficiently hard to be cultivatable was 24,707.08 acres. One hundred forty-four growers stated that they had no oysters on their beds at that time. One hundred and three growers reported as having on their beds at that time 2,492,355 bushels, an average of 24,198 bushels for each grower.

The largest amount reported as being at that time on the beds by any one grower was 345,000 bushels, and he was not the owner of the largest acreage of oyster ground. Six others reported as having over 100,000 bushels upon their beds at that

time, as follows: 333,000; 290,000; 200,000; 184,507; 170,000; and 119,000. These six growers are not the owners of the largest amount of acreage.

The total amount of bushels which was reported as having been transferred to other beds outside of the State or sold during the past five years was as follows:

1905,	767,883 bushels.
1906,	1,197,350 bushels.
1907,	1,363,642 bushels.
1908,	976,668 bushels.
1909,	1,588,809 bushels.

The total number of bushels of oysters thus sold or transferred from Connecticut beds during the past five years was 5,894,352 bushels. These figures, however, do not approximately equal the published claims that have been made by individual oyster growers in conducting their industries, and the Board is forced to believe do not equal by a large amount the correct totals.

The information given relative to the nature of the oyster grounds showed conclusively that a large portion of the acreage held under the franchises consists of muddy bottom. For the purpose of cultivation such ground is much less valuable than the hard ground.

The acreage of ground which is somewhat hard, but not entirely so, may be given as approximately 5,000 acres. The acreage of ground which is hard may be given as approximately 20,000 acres. The balance of the acreage may be considered to be muddy ground, approximately 45,000 acres.

While an attempt was made to secure from the oyster growers figures which would give some idea of the value per acre of the oyster grounds, it was clear that the figures submitted in the majority of cases could not be used for such purposes. In a large number of instances they followed the previous assessed valuations, while in cases of increase the value submitted was far from being a fair selling value of the franchises.

FRANCHISE TAXATION.

By consultation with the members of the Shell-Fish Commission, it was ascertained that in the matter of taxation, they had been acting under practically the same rule of valuation that was established when the Commission was created. They had been

taxing the franchises under state jurisdiction outside of the town lines at minimum figures following the tradition that none should be assessed at a value higher than forty dollars per acre, and assessing a large portion at one dollar per acre.

In spite of this tradition that no franchises should be assessed higher than forty dollars per acre, the town of Orange, in the revaluation of the oyster ground under the jurisdiction of that town in New Haven Harbor, placed a value of one thousand dollars per acre upon certain grounds which had been previously assessed by the State at forty dollars per acre. Such a revaluation, however, was placed on only a small area of shoal ground which has a particular value for growing as well as storage purposes. Such a relative difference in value would not apply to any other ground within the State's borders.

The Board of Equalization, in view of the fact that it was delegated by the resolution to act as a board of relief, considered it necessary to secure, if possible, equalized valuations of all the oyster ground franchises in the State, based as nearly as possible on a fair selling value. It was very evident that this was proper, and could be accomplished through experts only, for it would demand not only knowledge of the oyster business, but a definite knowledge of the oyster ground franchises in Connecticut, based upon business experience. Even the method of determining the valuation; by inspecting the lots and dredging the same to reveal the character of the bottom was shown not to be reliable, for certain hard ground is useless for oyster production for various reasons, while other hard ground is very valuable. In addition, some soft and muddy ground is very well adapted to setting, providing oysters are not left there too long, while other soft grounds appear to be almost useless, until they are hardened by depositing sand, shells, etc. Furthermore, a dredge thrown on one corner of a lot might show a very valuable bottom containing a good production of oysters, while other portions might be soft mud. The time required for such inspection, the cost, and the unsatisfactory and unreliable character of the data to be secured made it advisable to abandon such methods for the purpose desired.

EXPERT VALUATION.

The only other plan was to secure the coöperation and services of a competent and experienced expert to make the valua-

tions. The Board finally secured for such purposes Captain E. Frank Lockwood of Cos Cob, Connecticut. He is a man of large experience in the oyster business, which was followed by his father and which has been continued by him for forty years or more. He has a definite knowledge of practically all the oyster ground in Connecticut, and has bought and sold a large amount of such land. Captain Lockwood, recently, had sold out his oyster business in Connecticut, and at that time he owned no oyster ground, nor had he business affiliations with any oyster growers. Many of the oyster growers have stated that there could be no better selection of authority to determine the value of Connecticut ground franchises.

Arrangements were made with Captain Lockwood to place an acreage appraisal on all the oyster ground in the State under private ownership, on the basis of its fair value. Mr. Frederick L. Perry, the clerk of the Shell-Fish Commission, who is designated by the statutes as the official assessor of all such oyster lands, signified his entire willingness to follow the appraisal made by Captain Lockwood, as accepted by the Board. The result was that the assessed valuations of all the oyster lands in the State's jurisdiction as made by Mr. Perry, with the exception of some of the harbors, were, practically, the appraisals made by Captain Lockwood.

METHOD OF TAXATION.

These assessed valuations, as finally determined by Mr. Perry, were graded from \$5.00, as the minimum valuation per acre, to \$150.00 per acre, as the maximum, on the grounds within the State's jurisdiction and outside the town limits. The previous valuations for the same lots had been \$1.00 and \$40.00 per acre, respectively. The valuations of the other lots under the special franchise were graded between the minimum and maximum in accordance with their fair value as compared with other lots. The valuations of the lots under state jurisdiction within the town lines recently had been readjusted, many of them of higher value up to \$1,000 per acre. Very few changes were made in such valuations at this time by Mr. Perry.

BOARD OF RELIEF.

In accordance with the resolution requiring the Board of Equalization to act as a board of relief, the following notice was

published in all the newspapers in towns contiguous to oyster grounds:

NOTICE.

NOTICE is hereby given that the BOARD OF EQUALIZATION, as the commission appointed to investigate oyster properties in accordance with Special Law No. 486, Session of 1909, will meet as a BOARD OF RELIEF to consider appeals from assessments on oyster grounds within the exclusive jurisdiction of the State, on the Tuesday following the first Monday in January, 1910, to wit, January fourth, in Room 60, the State Capitol, Hartford, at 10.45 A. M.

FREEMAN F. PATTEN,
THOMAS D. BRADSTREET,
WILLIAM H. CORBIN,
Board of Equalization.

Hartford, Connecticut,
December 20, 1909.

All applicants for relief were required to fill out the following blanks, using a separate one for each lot, unless they were of similar nature and valuation. In each case the several lots were designated and described on one application.

Sheet No.....

STATE OF CONNECTICUT
1910
OYSTER PROPERTIES

Application to the Board of Equalization, acting as a Board of Relief, as provided in Special Law 486, Session of 1909.

A separate sheet should be used for each lot on which a reduction is requested, except that all lots at the minimum valuation may be included on one sheet.

Complaint of Owner.

Location of ground:

Town Lot No.....

Kind of ground

.....

.....

.....

Total number of acres in lot.	Acres cultivatable.	Acres not cultivatable.	Acres actually cultivated.	Acres not actually cultivated.
.....
Assessed valuation	\$.....	\$.....
Owner's valuation	\$.....	\$.....

.....

.....

.....

Estimated number of bushels of oysters on
 lot at present time Age.....
 Number of bushels caught for transfer or
 sale during the past five years Age.....

Reasons for complaint

 Signed
 Date, 1910.

Three hearings were held in the Supreme Court Room, at the State Capitol, on January 4, 14, and 25, 1910. Sixty-two individuals or corporations presented 356 applications for relief. Forty-seven persons at the various hearings appeared before the Board and after being put under oath were heard relative to the claims for a reduction in valuation as set forth upon the individual's application. The proceedings of the hearings were taken stenographically and are included in a record of 172 type-written pages.

There was comparatively little opposition to the assessed valuation of the more valuable lots, but there was great objection to the increase in valuation from \$1.00 to \$5.00 on the so-called "worthless ground." The hearings were of very great benefit to the Board, enabling the members to become acquainted with the oyster growers, and to secure much information relative to the nature and treatment of the ground used for the cultivation of oysters, with many other details of the business. In the main, the valuations, as determined by Mr. Perry, were approved by the Board. A few changes were made where evidences of inequality in the valuation of one lot, as compared with the similar contiguous lots, were made clear in the testimony. The Board decided to adhere to a minimum valuation of \$5.00 on a portion of the grounds. The general reasons for this action are given on page 21 of this report.

The total assessed valuation of oyster ground under state jurisdiction for the year 1909 was \$889,412.92. The total assessed valuation of the same oyster ground as approved by the

Board of Equalization, as a board of relief, for the year 1909 was \$1,804,362.59. The amount of the tax to be received from the 15-mill tax on the two lists are, 1908 \$11,892.62; 1909 \$26,141.58, not including that payable to the towns.

It is shown, herewith, that the amount to be received from taxes on the oyster franchise in the State's jurisdiction has been increased \$14,248.96 over that of the previous year. After very careful deliberation the Board of Equalization is of the opinion that the assessed valuations per acre, which have been given to the different lots held under the special franchise as shown on the maps which accompany this report, represent a fair equalized valuation of such franchises.

MINIMUM VALUATION OF OYSTER GROUNDS.

Oyster ground in Connecticut is held under what is known as the perpetual franchise system. An applicant is obliged to sign an application (see page 103) in which he states that he "*wishes and INTENDS TO USE said ground for PLANTING AND CULTIVATING SHELL-FISH.*"

The next step in the procedure is the making of a grant (see page 104) in which the Commissioners grant the grounds covered by the application, giving detailed description of the same, and in which the statements in the application are found to be true and the ground granted in accordance with such statements, and the fact is again expressed in the grant as in the application, that the applicant wishes and intends to use said ground for planting and cultivating shell-fish. In the grant there is also the proviso that the grantee or holder of said ground "*shall actually use and occupy the same for the purposes named in good faith within five years from the date of the grant.*" This latter provision is in accordance with the provisions of section 3219 of the General Statutes, in which it is expressly provided that upon petition to the superior court, the Commissioners may cause grounds not used and occupied in good faith to revert to the State.

Manifestly all applications which have been granted have been upon the express understanding, that the grounds covered thereby should be occupied for the purpose of planting and cultivating shell-fish. If they are so occupied, or have been, and the char-

acter of the ground is such as to make future occupation reasonably probable, then a minimum valuation, for instance, of \$5.00 an acre, is not unreasonable; for if ground is of any value whatever for the purposes of oyster culture, it must be worth that figure, which would mean under the rate of taxation now in force only seven and one-half cents per acre per annum in the way of a tax.

If, as some parties contend, the ground is of no value whatever, and cannot be made valuable except by the outlay of money, in the way of hardening said ground by depositing thereon sand or other hardening material, then the statement in the application that the applicant wished and intended to use said ground for planting and cultivating shell-fish was misleading, for the wish and intention were so vague (unless indeed the applicant could show that he had made arrangements definitely for having material placed on the ground) as to be a mere contingency and not a wish or an intent at all.

Grounds which are known to be black mud, for instance, and which have always been of that character, and which in all human probability will never be anything different except by artificial hardening, of course, cannot be termed reasonably suitable for planting and cultivating shell-fish, and any one taking up and holding for years such grounds under such a grant as has been referred to, cannot be said to be acting in good faith.

The amount of revenue which the State of Connecticut derives from grounds of this character, as compared with the total, is insignificant, and the question must present itself whether or not the taxation of this ground at a sufficient figure to test the good faith of the former applicant and present holder is desirable.

If a person holding for instance several thousands of acres of such grounds should say that he intended to harden them, the carrying out of any such intention would be a manifest impossibility, as there is not sufficient amount of material available for this purpose to harden any considerable amount in any given territory.

Growers can tell how much they have hardened, but none have ever claimed to have improved any great amount; indeed the representations have always been that growers had all the ground they needed without hardening any more.

PUBLIC HEARINGS.

Following the meetings of the Board when acting as a board of relief, public hearings were held on February 18, 1910, in Bridgeport; March 18, in South Norwalk; April 8, in New Haven, pursuant to the following notice.

HARTFORD, CONN.

The State Board of Equalization, acting as a Commission to investigate the oyster properties, will hold a public hearing at Bridgeport, etc., to which it invites owners of oyster properties and natural growers in this State to be present, to give their views relative to the conditions prevailing in the protection and taxation of such properties; to the production thereof, and the revenue therefrom; the present policy of the State towards the same and desirable changes therein.

Very truly yours,

BOARD OF EQUALIZATION AND OYSTER
INVESTIGATION COMMISSION.

A copy of this notice was sent to every holder of ground under franchise, and to every natural growther in the State. There was a very good attendance at all the meetings. The discussion of the oyster industry in its relation to the State was free and frank, and participated in by nearly all the leading private growers, and a goodly number of the natural growers.

The attitude of these men toward the Board, both in their manner and remarks, was very cordial, and they freely answered all questions. They expressed themselves as being ready and perfectly willing to pay any fair tax to the State, which was equally and equitably determined, taking into consideration the expense of experimentization and the vicissitudes of the business. They emphasized particularly, however, their right to certain definite protection from the State in return for the taxes paid. They ask for judicial interpretation or additional legislation which will prevent depredations and encroachments upon their rights, and also immediate and practical legislative action, which will begin the purification of the polluted rivers, harbors, and coastal waters, which are so well adapted to the oyster industry.

While the business has grown from its first beginnings to a large volume, it is actually and seriously endangered at the present time because of the continued and increased contamination

of oyster beds by sewage and the waste product of factories. The growers maintain that this condition should be improved, not only to safeguard the present business, but to develop it to much larger proportions, which would result in an increase in the amount of oysters grown and in the value of the franchises, and a consequent development of the taxable property on shore. In addition such action would prevent the extermination of fish and other sea food which cannot live in the polluted waters, and finally, they claim, that the continuation of such contamination is a positive menace to the health of the rapidly growing population which lives along the shores of the Sound.

As stated by one large oyster grower "the matter of increased taxation is a mere bagatelle in its relation to the oyster industry, as compared to the great question of the removal of the causes of contamination which so seriously menace the use of a large amount of ground of very great adaptability to oyster culture."

PECULIARITIES OF THE CONNECTICUT OYSTER INDUSTRY.

There are certain peculiar conditions connected with the growing of oysters in Connecticut waters. Originally there was a moderate supply of oysters on the natural beds which seemed to be sufficient for the small demand. When an increased supply was necessary the growers commenced the cultivation of oysters on land secured under the franchise law. This industry, which began a little before 1880, has continued with large increase in developments, many vicissitudes, and many remarkable successes until the present day.

Originally the seed was grown and the oysters were matured in Connecticut waters. After a while, however, it became evident, because of certain unexpected experiences, that the oysters grew more satisfactorily and reached a better condition for market if transferred to oyster grounds in Rhode Island or on the Long Island Shores. The violent storms and accompanying gales on the open Sound, occasionally, caused great loss of oysters, but the principal reasons for the transfer to other grounds was, as stated above, because of the appearance of a green color in the oysters. This is supposed to be caused by a vegetable substance, although some oystermen claim it is caused

by the contamination of the waters by shore industries. In any event, the green appearance makes the oysters less desirable for market and forces the growers to transfer them to other grounds for maturing. While it is not claimed that the green color makes the oysters unhealthful, the trade will not buy them. As one consumer said, "Don't send me another green oyster, send me some ripe ones."

In addition, the transfer from one locality to another seems to hasten the development and to produce a more attractive oyster in every way for the market. The result is that a very large portion of the cultivated oyster grounds in Connecticut are used for raising seed and for growing oysters for two or three years prior to the transfer. There are certain firms, however, who have continued to leave the oysters in Connecticut waters up to the time of catching for opening purposes. This happens at Stony Creek, New Haven, and possibly other places west of those points where the green color is not evident.

Further, the contamination of the streams and harbors by sewage and waste from factories has made it absolutely necessary to transfer oysters from many beds to purer waters before they are opened. The Connecticut waters are very uncertain in producing a set as compared with those in some other states, and on some parts of the oyster grounds in this State there has not been a set for several years.

In spite, however, of the above uncertainties it is well known that seed oysters from Connecticut grounds are the most desirable of all in the estimation of the scientific oyster growers. This oyster seed, if properly transferred to suitable waters, produces the best oysters in size, appearance, and taste, and they command a good price throughout the country. Practically all the celebrated Blue Point oysters are grown from Connecticut seed. Nearly all the oysters opened or shucked in this State are oysters that were originally started in Connecticut waters, from Connecticut seed, transferred to Long Island or Rhode Island for a varying period of several months, and brought back again to the Connecticut opening houses to be shucked and shipped to different parts of the country.

All the above facts should be taken into consideration in comparing Connecticut conditions, both as to production and revenue with those of any other state.

COMPARISON WITH RHODE ISLAND.

Considerable has been said in Connecticut public prints relative to the oyster grounds of Connecticut as compared with those of Rhode Island, both in their productivity, and the revenue derived therefrom. Investigation by this Board has convinced it that the conditions in the two states are quite different.

In Connecticut, there are 31,060 acres which are cultivated and which vary in value from \$15.00 to \$150.00 per acre. Of these there are 489 acres assessed at \$150.00 per acre; 3,754 acres at \$100.00 per acre; 5,458 acres at \$75.00; 5,264 acres at \$50.00; 7,434 acres at \$25.00; 8,661 acres at \$10.00. There are also 38,679 acres of ground not cultivated because of mud or other reasons. The Connecticut grounds vary greatly in their value on account of their location, nature of the bottom, depth of water, freedom from contamination, and general productivity. Connecticut has followed the policy of selling a perpetual franchise on these oyster grounds.

Rhode Island has not adopted the policy of selling franchises, but has retained the ownership of all their oyster grounds, and has leased certain of the same for a period not less than five nor more than ten years, subject to renewal at the expiration of said period. The total ground thus leased in Rhode Island under such conditions January 1, 1910, was 16,814.7 acres. For all such ground where the water is of the depth of less than 12 feet at average low water, the annual rental is \$10 per acre. For all grounds where the water is of the depth of at least 12 feet, at the average at low water, the annual rental is not less than \$5.00 per acre. The leased ground is divided as follows: 5,561.9 acres at \$10.00 per acre, yielding an annual rental of \$55,619, and 11,252.8 acres that is leased at \$5.00 per acre, or an annual rental of \$56,264, making a total of \$111,883 per annum which Rhode Island thus receives. Compared with the revenue from Connecticut this is certainly a large sum. Rhode Island is able to secure this revenue for the following reasons; the use of the leasing system instead of private ownership; the uniform good quality and fertility of the grounds; the peculiar nature of the Narragansett Bay waters, due possibly to the amount of fresh water which flows into the Bay, thereby decreasing the salty and otherwise disagreeable condition pertaining to oyster cultivation in

less favored waters; entire absence of any green appearance; the protection afforded by the Bay; the removal of contaminating substances and the strict laws against pollution of streams and harbors; and the convenient depth of the water for cultivation. Nearly all these desirable qualities are lacking in Connecticut waters, and it is impossible, therefore, to compare the two industries on the same basis in considering the revenue derived therefrom.

The oyster growers who lease the Rhode Island grounds have no investment which is represented by the grounds themselves. They incur no expense on account of experimental hardening and consequently they are not obliged to make an annual interest charge against the investment, their total expense being the rental fee. The comparative cost of the best ground in Connecticut which may be similar to the best ground in Rhode Island would be represented on an assessed valuation of \$150.00 per acre by the interest on the investment at 5 per cent., which would amount to \$7.50, plus the tax at a rate of $1\frac{1}{2}$ per cent., amounting to \$2.25, or a total annual charge of \$9.75 per acre as against the total charge of \$10.00 in Rhode Island. The land assessed at \$100.00 on a similar computation would show fixed charges of \$6.50 per acre, and the land assessed at \$75.00 would show fixed charges of \$4.87 per acre, which would be comparatively lower than the land leased for \$5.00 per acre in Rhode Island. All land assessed at a less figure than \$75.00 per acre would bear fixed charges considerably less than the annual minimum Rhode Island rental, but such land is supposed to be much less desirable in every particular.

The preceding statement is made not so much for the purpose of confirming the assessed valuations adopted by the Board as to show a definite comparison of the conditions and charges in the two states.

The Connecticut Shell-Fish Commission in their report for the year ending September, 1901, made the following statement relative to receipts from Rhode Island oyster grounds as compared with those in Connecticut:

"The sudden rise in the receipts of Rhode Island from these sources was contemporaneous with the appreciation by Connecticut growers of the fact that the advantages of maturing seed oysters for the market in Narragansett Bay were very great, and

that they could make money by transferring their young oysters from their Connecticut beds to Rhode Island waters, notwithstanding the expense of the transfer and the high charges in that state for the use of the grounds.

"No intelligent man need be told that Connecticut planters of long experience in the business would not have made this change and incurred this extra expense and trouble had there been like inducements at home. But Connecticut has no such facilities to offer. Were it possible for Connecticut growers to mature their seed oysters at home in the same time as in Narragansett Bay, they would gladly pay the same price to Connecticut for the privilege and save themselves the expense of the long haul and transfer. But Connecticut has no grounds located as are those of Rhode Island and so favorable for the rapid development of the young oyster to a marketable state. While Connecticut matures the best oysters in the world, Rhode Island can mature them quicker.

"How long these favorable conditions will last on the Rhode Island oyster grounds it is impossible to judge at present. But be that as it may, the whole matter resolves itself into the fact that Rhode Island offers inducements now which Connecticut does not and cannot, and for which Connecticut growers are willing to pay the increased price.

"From the general situation of the grounds in the two states those in Rhode Island may be likened to the small but valuable 'garden spot,' while the Connecticut grounds represent the broad 'farm lands' with the mixture of 'good, bad, and indifferent' of the average agricultural district."

OYSTER SET.

The Connecticut waters have not been so reliable in producing an oyster set as those of Rhode Island and some other states. No data available to the public have been collated to show the conditions and causes which prevent the regularity of set.

The following table, which has been prepared from the reports of the Shell-Fish Commission, gives a fair idea of the occurrence of the set during the years since 1888:

1888 No set	1895 Set.
1889 " "	1896 "
1890 Set.	1897 "
1891 "	1898 No set.
1892 "	1899 Set.
1893 "	1900 "
1894 "	1901 No set.

1902 No set.	1907 Set almost a failure.
1903 " "	1908 Fair set, but not of good vitality.
1904 Very good and general set.	1909 Fair set.
1905 Scattering and uneven.	1910 No general set.
1906 Set almost a failure.	

Sufficient tests should be made and reports received every summer relative to temperature of water and other possible influences to make it clear, under what conditions a good set is secured, and under what conditions there is no set. In the years when there is no set the oyster growers are obliged to rely for their marketing product upon oysters of other years, thus making seed from previous sets fill the demand for the market. This requires, in some cases, the sale of smaller oysters than would have been marketed under ordinary conditions.

FUTURE DISPOSITION OF CONNECTICUT OYSTER GROUND.

The Board is convinced that the present system of allotting oyster ground in the State's jurisdiction under a perpetual franchise is entirely antagonistic to the interests of the State. As stated previously, Connecticut is the only state which permits such a disposition to be made. Our nearest neighbor, Rhode Island, has shown conclusively the wisdom which she employed in adopting a leasing system and the resulting advantage to the State. It has enabled her to share in the prosperous development of the oyster industry which is carried on in Narragansett Bay.

This is shown by the following statement of the gross receipts received by Rhode Island for rents of oyster grounds since 1864, when the office of the Commissioners of Shell-Fisheries was established:

1864	\$ 61.00
1867	1,568.50
1877	6,045.25
1887	8,649.00
1899	13,558.46
1901	25,767.38
1904	45,252.58
1907	85,321.13
1910	111,883.00 (Estimated)

In Connecticut, many thousands of acres of what is now very valuable oyster ground has been secured under perpetual franchises from the State by the payment of one dollar per acre. These franchises may be sold, and are transferred in practically the same manner as real property. In addition, many other acres of ground, which were taken up on the payment of one dollar per acre by private owners, have not been improved nor developed for the very reason that the owners of these franchises were too much occupied with the development of other acreage.

The result has been that a considerable amount of such land held as a part of a large acreage by private owners is practically in the same condition as when it was first taken up.

If, however, some of this land could have been leased to others interested in the oyster industry, or who were anxious to go into the business, it might have been possible to have secured a scientific development and cultivation of such land, which would have increased its value both to the State and to the individual. The Board definitely recommends that the law be so amended that all land in the State's jurisdiction outside the town lines, which is not already allotted to private owners, and all land which shall be given up by those now holding the same under franchises, shall in the future be given out under a new application on a lease basis for a term of from five to ten years, with the option of renewal subject to a definite annual rental payment, and to be under the control and direction of the Shell-Fish Commissioners.

OYSTER POLICE.

At the session of 1895 a law was passed authorizing the Commissioners to appoint five or more persons to act as oyster police. The expense has been approximately three thousand dollars per year, and the policing has been done by districts, there being six, reaching from Branford to Greenwich. The amounts allotted to each district vary in accordance with the assessed value of the oyster ground; the largest amount being for the New Haven district, the second largest for Bridgeport.

In no case is the oyster police wholly compensated by the State, and, in all the districts but one, they are individuals in the employ of private growers or bodies of private growers and are paid principally by them, and do the work for the State as an

incident. In fact while the men are nominally in the employ of the State, in all cases but one the men's names are suggested by the employer, who pays the principal sum, and is a member of a committee of growers in that district. The appointments are made solely on such recommendations.

This system is merely a form of private watching and it would be fully as effective if the Commissioners were empowered to vest these private watchmen with police powers and then to turn over the money directly to the man in each district by whom the watchman is principally compensated. Such a system is not effective and is nothing more or less than a waste of the State's money. The objections to this method are many. The most that is claimed for it is that the police constitute a sort of scarecrow, but if there are those who desire to steal oysters or commit other offences against the shell-fish laws, it is obvious that all they need to do is to do the job in pairs—one man to watch the police and the other to steal the oysters, and then get together afterwards and "divide the swag."

In no case is it possible for the oyster police to properly cover his district with any facilities that are afforded him by the State. For example, in the district of New Haven, which pays \$75.00 per month for oyster police, it would be physically impossible for the man on duty to sail over all the ground which he is supposed to police in one night providing he had fair wind all the time. There is power on his boat, but the engine is so small that it is of little use except possibly to get him home in case the boat is becalmed.

If the State is to do *effective* oyster policing, boats should be provided capable of covering the territory in each case, and if this were done it would require a sum larger in amount than is received from taxes on all shell-fish grounds, to say nothing about the expense of salaries, maintenance, etc.

The system that the Board seriously recommends as a substitute is to repeal the law providing state police and to provide a bounty large enough to make it an object for any boat which happens to be on the Sound to do oyster police work.

INSPECTORS OF MUD DUMPING.

There is a provision in the statutes that persons or corporations dredging mud or refuse material by boat from any harbor

in this State wherein or south of which oyster grounds are located and designated, shall notify the Commissioners of their intention to dump material, and that the Commissioners shall designate suitable places where the material may be so dumped and shall appoint inspectors to accompany the boat. This provision does not apply to any work authorized to be done by the United States government.

No authority is given these inspectors, and they simply ride up and down on the boats with no power to interfere, if an attempt were made to dump otherwise than in accordance with the instructions. It is a little difficult to see how they are supposed to earn their \$2.50 per day, except in cases where they would be convenient witnesses in disputes as to an alleged dump.

In case of dumping hard material on oyster beds, the owner of the beds employs and pays his own inspector, and it is only when the material goes to the public dumping ground, and the work is not authorized by the United States government, that these inspectors are employed and paid by the State. This expenditure cannot be justified. The amount appropriated is \$250 per year, but the amount actually expended has never been less than \$400 per year, and in some years has been as high as \$1,600. This expenditure, it should be remembered, is for the employment of individuals who are vested with no authority whatever by the statute and who can do nothing except report any injury done to private individuals. It has never been claimed that the State had any interest whatever in the matter.

It is perfectly obvious that these inspectors ought to be appointed by the State and vested with the same authority that United States dumping inspectors have under the federal statutes, and that they should be paid by the parties doing the work. The most convenient method probably would be that of having the expense of the inspection included in the original contract and paid by the contractor as part of the job in each case.

The following table shows the cost of dumping inspectors since 1886:

1886	\$387.50	1891	\$ 67.50
1887	440.78	1892	612.50
1888	532.50	1893-94	2,090.69
1889	465.85	1895	205.00
1890	932.50	1896	797.44

1897	\$1,195.91	1904	\$ 318.67
1898	404.40	1905	1,685.07
1899	1,314.61	1906	1,209.51
1900	403.60	1907	426.84
1901	303.84	1908	418.70
1902	37.50	1909	740.00
1903	807.80	1910	601.70

Total, \$16,400.41

The Board definitely recommends the amendment of the statute relative to dumping so that the expense of the inspectors shall be paid by the contractors.

BUOYING.

It is provided by statute that certain natural beds, four in number, shall be buoyed by the State. There is also a provision that the Commissioners shall not expend for that purpose a sum exceeding one-half the amount received for licenses during the preceding year. Inasmuch as specific amounts have been appropriated for buoying the beds, and as the amounts specified in the statute would be ridiculously small in many instances to do the work properly, it has always been assumed that the Legislature, by appropriating a specific sum, repealed by implication the language in the statute referred to. The amount which is expended is substantially \$1,200 per year. This amount has increased about \$200 annually in the last few years on account of the increase in the cost of buoys and in the charges for the use of steamer, etc.

The only persons who are benefited by buoying the natural beds are the owners of private ground adjoining. It is obvious that if they kept up their buoys in accordance with the statute which provides that each owner shall buoy his corners, and these private buoys were accurately set, it would be unnecessary for the State to maintain another line of buoys exactly in the same places. It is hard to see any reasonable justification for this great expense by the State, when it is considered that the money is taken from general taxation and, as has been said, benefits only such owners as happen to hold ground adjoining the natural bed.

The expense for buoying and inspecting the natural beds has been more than double the amount received for licenses from the

natural growers since the license system was established. The amount thus received for licenses is the only revenue received by the State from the immensely valuable property called the "natural beds," and to spend the whole of this sum for buoying, leaving no revenue to the State from this source, is a system which cannot be defended, to say nothing of expending as much more from the small amount derived from taxes.

The license fees were raised during the season of 1907 and it was thought that the amount received would be large enough so that no deficit would occur on this account, and that has been true in the years when there has been a set on the beds, but during the present year the amount received for licenses has been only about \$700, which is but a little more than one-half enough to provide the expense of buoying.

The buoying cannot be effectively done for any less amount than is now expended for this purpose, and the question is whether the State shall maintain the present system or do away with the buoying altogether.

The cost of buoying since 1895 has been as follows:

1895	\$ 390.85	1903	\$ 633.40
1896	570.83	1904	696.20
1897	861.24	1905	1,001.24
1898	703.34	1906	895.05
1899	1,876.42	1907	932.50
1900	1,134.85	1908	1,104.45
1901	1,545.99	1909	1,116.70
1902	957.86	1910	1,237.30

Total, \$15,658.22

The receipts from licenses during the same period have been \$11,179.00, showing a deficit on the cost of buoying alone of \$3,479.22.

The Board definitely recommends the repeal of the law requiring buoys to be set at the expense of the State.

PROVISIONS GOVERNING OWNERSHIP AND TAXATION OF OYSTER PROPERTIES IN DIFFERENT STATES.

A digest of the laws of the oyster-producing states which shows their methods of taxation of oyster ground, and, in many instances, of the oysters themselves, is given herewith.

It will be seen that Connecticut is the only state that has granted a perpetual franchise ownership of oyster ground. In all the others any rights to the use of the ground are based upon a leasing system, instead of on that of absolute ownership. Several states require a definite bushel tax in addition to the annual payment under the lease.

CONNECTICUT.

Method of Taxation.

Fifteen-mill tax on the assessed valuation of the oyster ground franchise owned by planters. Natural growers required to have a boat license, which is \$5.00 for a boat under 5 tons, and \$1.50 for each additional ton when a boat exceeds five tons.

DELAWARE.

Method of Taxation.

Tonnage rate on boats of over nine tons is \$2.50 per ton; entitles individuals to use of 50 acres. Tax on 50 acres is \$25.00 in addition to tonnage tax. Less than 9 tons \$2.50 per ton, with 25 acres, on which a tax of \$15.00 per year is paid.

Individuals are entitled to use of land so long as tax and tonnage rate is paid.

FLORIDA.

No statute taxing oyster lands.

LOUISIANA.

Method of Taxation.

Privilege tax 3c per bbl. Canning license, varying from \$10.00 to \$100.00 according to number of steam boxes used, shuckers employed, or amount of oysters handled. License for boats from \$10.00 to \$25.00; also a tonnage license of 50c in addition. Land leased for \$1.00 per acre annually.

MAINE.

No taxation of oyster property.

MARYLAND.

Method of Taxation.

Leases to citizens of State only, at rate of not less than \$1.00 per acre. Limit of leases 20 years. \$1.00 per acre for 2 years; \$2.00 for 3d year; \$3.00 for 4th year; \$4.00 for 5th year; \$5.00 per year for balance of 20 years. In addition to the above there is a bushel tax on oysters bought and sold.

MASSACHUSETTS.

Method of Taxation.

No special laws relative to taxation of oyster lands. .
Probably would be taxed under general laws applicable to
taxation of other property.

NEW JERSEY.

Method of Taxation.

Leases to citizens of State only at rate of not less than
25c per acre. The lowest rate is \$.50 and in one district
\$1.00. Grounds are leased for catching seed at rate of \$3.00
per acre per annum. In one district there is a boat license,
or tonnage tax, ranging from \$5.00 to \$50.00, rated \$2.50 per
ton.

NEW YORK.

Method of Taxation.

Flat tax by the acre upon all shell-fish lands (with
some exceptions) of 25c per acre, except where taxed through
ordinary channels by the towns, in addition to an annual
rental of not less than \$2.00 per acre. In certain towns,
leased to highest bidder at auction.

NORTH CAROLINA.

Method of Taxation.

Subject to lease by the year. Rental of \$1.00 per acre
annually.

RHODE ISLAND.

Method of Taxation.

No special tax on oyster lands. Land leased to planters.
Neither land nor oysters are taxed by the State. Oysters
are personal property and might be taxed as such, but no
case is known of such action. \$10.00 per acre where water
is less than 12 ft., and \$5.00 per acre where water is over
12 ft., annually.

TEXAS.

Method of Taxation.

Rental system, but no direct taxation. 15c per acre for
part of year; 25c per acre for next four years, and 75c after-
wards. 2c per bbl. for oysters taken from either public or
private beds, and a license system.

VIRGINIA.

Method of Taxation.

Ground leased at an annual rental of \$1.00 per acre.

EARLY TAXATION.

The taxation of the oyster properties has been a live issue, apparently, since the creation of the Connecticut Board of Shell-Fish Commissioners in 1881. The following extracts from different reports of the Commission show their opinions of the difficulties and uncertainties of the present method of taxing the oyster franchises based on the value of land from one to twenty fathoms under water.

EXTRACT FROM FIRST ANNUAL REPORT OF THE SHELL-FISH COMMISSIONERS.

January Session 1882.

RECOMMENDING A METHOD OF TAXATION.

Another class of oystermen advised that a tax shall be raised in the form of a license to be paid by every one cultivating state beds, proportionate to the size of the beds. Another class recommended a tax upon the annual product of the beds. A paper signed by 123 oystermen of Norwalk, presented to the Commissioners, recommends that all the lands should be subject to a reasonable *pro rata* tax.

Many other suggestions have been made; but after weighing, carefully, everything brought to their attention, the Commissioners have reached the conclusion that there is no good reason for departing from the usual methods of the State in laying and collecting a tax not only upon the grounds but also upon the oysters growing thereon. An oyster farm is analogous to a cattle farm. By law, the land of the latter is taxed on its assessed value, and so are the cattle, young and old, and they are taxed every year. No one questions the propriety of the tax, and the Commissioners see no reason why oyster grounds and the oysters that feed thereon, young and old, should not be taxed in like manner.

They respectfully submit, therefore, that the grounds under state control and the products of the grounds should be assessed annually, and a tax laid on the assessed value should be made payable on the first day of October in each year; values to be ascertained from sworn lists subject to investigation and revision when deemed necessary. Every owner should be required to deliver his list to some proper officer on or before

some day to be determined, and on failure so to do the said officer should be authorized to make up such list as he may be able, on which a double rate of tax should be levied.

EXTRACT FROM SECOND ANNUAL REPORT OF THE SHELL-FISH COMMISSIONERS.

1883.

THE FIRST TAXING YEAR.

There is another important fact which bears upon this subject, one to which the Commissioners feel constrained to call particular attention: By law all owners are required to file with the Commissioners a statement, *under oath*, wherein they shall give, not only the number of acres owned by them, but also *the value thereof* per acre. With many honorable exceptions, the valuations of cultivated grounds have been set in the lists at ridiculously small figures. A reasonable estimate would, unquestionably, increase these figures tenfold. A comparison of the lists with each other is conclusive of these under-valuations. Adjacent lots, of like character and condition in every respect, are valued, one, five, ten, or fifteen times more than the other, and this simply because one owner has a better moral sense than another. Some men deem it commendable to deceive the tax gatherer. They do not seem to realize the fact that in doing so they commit perjury and rob the State. So great were the differences in the valuation of grounds given in the lists, the Commissioners were compelled to perform a great amount of labor before they could approximate to reasonable equalization of values; and in doing this the figures were largely increased, and yet not without great misgiving in many cases that the increased valuation was not as high as it ought to be. The novelty of the work making an entire new list without any previous list for a guide, and the difficulty experienced in procuring information except from parties directly or indirectly interested, forced the Commissioners to place the estimates below, rather than above, the true valuation.

The plea, so often heard, that the oyster industry of the State is in its infancy and should, consequently, be lightly taxed, is more plausible than sound. It is true the industry is in its infancy, but the infant has had a gigantic development and growth, and is fully able to bear its fair share of public burdens. The pioneers of deep water planting have been so long and so conspicuously successful that their business must be regarded as established. The many who have more recently embarked in the business have doubtless been prompted so to do by the reasonable prospect of a like success. In view of the cheapness of grounds, and the moderate cost of cultivating, the net profits must be considered large. It is admitted that there are risks in the business, and

that serious losses sometimes arise from storms, noxious animals, and other causes; but the chances of profit are not thereby materially diminished. In the long run the results are quite as gratifying as are those of the best mercantile or manufacturing industries. This is corroborated by the experience of those who have been longest in the business in this State, and also of most of the Rhode Island cultivators. The grocer or butcher just starting in a business where he has invested his capital, it may be his all, would not think of asking any reduction or exemption from tax, because his business was in its infancy. He knows that whatever property he owns is subject to taxation, regardless of the risks attendant upon its investment. And so it is with the oyster growers; there is no valid reason why property should not be fairly appraised and a fair tax raised thereon. Judging from the lists which have been presented for this year's taxes, it is believed that a better view of this subject begins to prevail among the oystermen.

EXTRACT FROM FOURTH REPORT OF THE SHELL-FISH COMMISSIONERS.

1885.

DIFFICULTIES OF ASSESSMENT.

In making the valuation of oyster grounds the Commissioners believe that not a lot has been overestimated. It is difficult for the uninitiated to appreciate the obstacles that must be overcome before reaching a just conclusion about the value of any submarine lot.

Could the waters covering a lot be made to recede, and lay bare the bottom so that one might observe its true suitability for the cultivation of oysters, their work then would not be half done. The depth of water, the various currents that flow over the ground, the quantity of food likely to be found there for the growing stock, its exposure to the attacks of stars and other marine enemies—all these elements are necessary to the formation of a correct estimate of value.

Their estimates of value have generally been received with approval, and the taxes based thereon have been promptly paid by the great majority of owners. There were some complaints which were presented, not only to the Commissioners personally, but also through the public press, with considerable acrimony; but the Commissioners did not deem it necessary to defend a work which commended itself to all impartial men. Persons who purchase more ground than they can cultivate, who hold large areas for speculative purposes, ought not to be relieved of their fair burden of tax because they reap no immediate benefit from their holdings. And yet this is the class of men, generally, who

have been loudest in their complaints. When compared with the valuations of oyster grounds in town jurisdiction and the tax laid thereon by town officers, the state tax laid by the Commissioners seems trifling.

EXTRACT FROM THE SEVENTH REPORT OF THE SHELL-FISH COMMISSIONERS.

October 31, 1887.

FUTILE OBJECTIONS OF LARGE OWNERS.

The State passed the tax law and made it one of the duties of the Commissioner to execute it. If it is a vicious law, change it; but it cannot be changed by attacking the Commissioners. Wipe the Commissioners out, and the law yet stands and must be enforced. Repeal the law, and it takes from the Commissioners only a small part of their duties, and that the most disagreeable part.

The promoter of this movement has 10,000 acres and upwards of oyster ground. With his two steamers he cannot cultivate thoroughly more than 500 acres. If he attempts more, he cannot keep it clean from stars. This he has attempted, and he has suffered like the rest. If his broad acres were divided up and held by other parties who would be glad to cultivate them, they would pay a higher tax to the State; and what is of equally great importance, would not be, as they now are, beds for unlimited star breeding.

It is this failure to cultivate large holdings that makes this tax seem so burdensome to owners. Let them sell off some of these good grounds that they hold for speculative purposes, and they will have more money and not feel the trifling tax the State lays on them.

This tax, as we have seen, averages about eleven cents an acre through the State. Is there any land above water in the State taxed so low as this? Now, if oyster ground is worth holding at all, if it is worth cultivating at all by these dissatisfied holders, surely eleven cents an acre can add nothing worth considering to the burden of cultivation. A dozen good oysters would pay the tax on each acre.

The Commissioners present the facts: It is for the State to say whether or not any tax shall be raised on the grounds, what it shall be, and how it shall be ascertained. The present system is full of uncertainty, perplexity, and difficulty. The appraisal of any property on shore is facilitated by inspection. It has a reputed value among those who are in its neighborhood, and a fair approximation may be secured without serious effort. But these oyster lots are out of sight—in some instances twenty fathoms under water. The man who knows their value best is the owner, and he is not inclined to tell about it. Indeed, the

greater number of oystermen fail to put a valuation on their list at all. The Commissioners have some general facts bearing on the question of value, obtained in various ways, but with the best knowledge they can obtain they sometimes err in their estimate, getting it either too high or too low.

It is not strange, therefore, that they have made mistakes of this character. They will always be made under such a system of taxation.

NEW METHOD OF TAXING OYSTER FRANCHISES.

The present system of collecting revenue from the oyster ground in this State is calculated to breed injustice. No property is harder to value than an oyster franchise. Of course, the property on the ground is not taxed, and many different elements enter into and may control the value of the ground for purposes of oyster culture. Theoretical considerations are of no consequence. The fact that the bottom is hard and apparently suitable for purposes of shell-fish culture has nothing to do with the practical side of the case. There are thousands of acres of hard bottom in this State where it has been proved over and over again that oysters cannot live and thrive. The fact then is that only by experiment can the value of a piece of ground for purposes of oyster culture be determined. The experimenter is the owner. It is not for his interest to disclose the value of his property to the assessor. The only other means of ascertaining this fact is hearsay evidence, pure and simple. The clerk of the Shell-Fish Commission, who is the assessor, is not a practical oysterman and never has been, and no person who has been the official assessor during the history of the oyster law has ever claimed to have any practical knowledge of the value of the property upon which he has placed a valuation, nor any information except what has come to him either from the owner himself or from other persons whose opinions may or may not be of value.

Complaint has been made that the assessments have been unjust in some cases. The wonder is that these complaints have been as few as they have been. The tribunal which then takes up the matter is the Shell-Fish Commission acting as a board of relief, and here again no one with any practical knowledge, or claiming to have any such knowledge, sits in judgment on this

question. The only testimony that is advanced in nine cases out of ten is the testimony of interested witnesses who would be more than human if they did not studiously seek to make it appear that the valuation is excessive.

To apply the same rule of valuation to property out of sight, which no one has an opportunity to examine except the owner of it, conditions as to which are unknown and must be unknown because of the fact that it would cost more to examine into them than the tax would amount to, is little short of ridiculous. This law seems to have been based on the taxation law as applied to real property, but any one can see that the conditions are totally diverse. In the case of real property it is in sight of every man. It has a known selling value ascertained either by the selling price of the property itself or other property similarly situated. In the case of oyster ground, however, it is a significant fact that very little of the best ground has changed hands since the oyster law was passed in 1881, and in the few cases where transfers have been made no one has known anything about the actual selling price excepting the parties interested. There is obviously no analogy between real property on shore and oyster franchises located many feet under water, so far as placing the valuation upon them by taxing authorities is concerned.

NEW TAXING RECOMMENDATIONS.

The question then is, can any better system be devised? The answer is, yes. The Louisiana system has been in successful use there for many years and is in all respects more logical and fairer, both to the owner and to the state (see law, page 89). This plan with some modifications is seriously recommended as follows:

1. Place a flat valuation on all ground under state jurisdiction of say \$10 per acre.

2. Place a productivity tax of two or three cents a bushel upon all seed or other oysters taken from any grounds in this State for sale, or for the purpose of removing the same out of the State.

3. Require a daily report to be made by the captain or person in charge of every boat or vessel engaged in dredging oysters—this report to be made directly to the Shell-Fish Commission and without inspection by the owner or manager of the

property from which the product is taken; also another report to be made quarterly by the owner of the ground to the Commission covering the same field.

4. Appoint a proper number of State Inspectors, say three, who have the right to go upon any oyster boat at any time and examine and measure the contents, and to go on property of any oysterman on shore for the purpose of making proper investigation of the accuracy of the reports handed in.

It might be necessary to provide for other details, but in the main it seems that this plan would be fair to all concerned, in that it would do away with all questions as to valuation of grounds. The real test as to such valuation is productivity. If ground produces well, it ought to be made to pay accordingly to the State. If it produces nothing, then it would have to pay nothing except the fifteen mills on a valuation of \$10 as specified, and, of course, if the ground produced nothing, the owner might release it to the State in accordance with the present law practice.

It may be said that very much of the ground now being held is, and always has been, held in violation of the terms of the original grants, because no use of it for purposes of oyster culture has ever been made by the owner. The ground has been held, apparently, to enable the owner to make large claims as to the amount of his acreage for purposes of advertising. It may be said, however, that if ground is of any use whatever for purposes of oyster culture it must be worth the \$10 an acre per year. This would require the owner to pay to the State only fifteen cents each year per acre on ground so held.

The proposed law would be automatic in its operation. There would be no assessor nor board of relief. The owner would pay nothing (except the fifteen cents an acre), if the ground produced nothing. If the ground produced little, he would pay little. If it produced much, he would pay and would doubtless be willing to pay in proportion. The claim is often made before the board of relief that no set has been secured for a certain number of years and that there has been nothing taken from the ground except old oysters, and that the value of the franchise for that particular year has been correspondingly low. These claims would adjust themselves under the proposed law, and it is difficult to see how any injustice could be done to anyone. Of course, it ought to be provided that the

reports should not be made public as to detail and, so as to prevent one dealer from prying into the affairs of another, they should be kept from public scrutiny.

NATURAL OYSTER BEDS.

The statutes provide that certain so-called natural oyster grounds shall be designated and reserved for the use and benefit of all persons, residents of this State, who shall take out an annual license in accordance with section 3234 of the General Statutes.

The payment required for such license shall be \$2 for every vessel or boat under five tons, and for a vessel or boat exceeding five tons, fifty cents for each additional ton, subject to conditions relative to size of boat, weight of dredge, power, etc., also owner's length of residence in the State.

There are nine such natural beds designated in Section 3214 of the General Statutes as follows:

Cormell Reef Natural Bed, 15 acres; Portchester Bed, 218 acres; Great Captains Island Natural Bed, 152 acres; Field Point Natural Bed, 84 acres; Greenwich Point Natural Bed, 403 acres; Fairfield Bar and Fairfield Natural Beds, 1,237 acres; Bridgeport Natural Bed, 334 acres; Stratford Natural Bed, 3,055 acres; Roton Point and Fish Island Natural Beds, 307 acres. The total acreage being 5,805 acres.

Of the beds mentioned above only the last four are buoyed by the State, and are, therefore, the only ones that are worked to any considerable extent. Originally all these beds were very productive, but the effect of continual use and their present condition is well described by Mr. B. Frank Wood, late Superintendent of the Bureau of Marine Fisheries of the State of New York, who is entirely familiar with all the oyster grounds in Long Island Sound. He says:

"It is no secret that the natural shell-fish lands under public waters of the State have been scraped and raked into a condition of almost entire depletion, until very few traces can be found of beds which could under the statutory definition be said to be of natural growth. This disappearance of natural growth shell-fish is not strange or wonderful, for it must be remembered that men, while giving nothing back and doing nothing to destroy the enemies of the shell-fish, have raked entire bays and arms of the sea bare of their product, thus destroying the balance of nature by use of the most radical means for the annihilation of oysters and clams.

"Natural forces are no doubt sufficient to conserve and even guarantee natural conditions, but when to the attacks of star-fish, borer, periwinkle, and other enemies of the shell-fish are added the sweeping raids of the all-consuming fisherman, there is certainly little left for the mollusc but extinction.

"It must be understood that as soon as oysters are found, numbers of fishermen crowd to the locality, and the shell-fish, before they are as large as a one-cent piece, are raked up and sold as seed. A few weeks or even days may suffice to deplete entirely the locality of oysters. That the shell-fish product under such destructive manipulation was in imminent danger of being practically wiped out, and that oysters might soon be obtainable only as a luxury for the rich, was years ago appreciated by those who have given the subject attention, and in consequence the existing system of state control was inaugurated. Under the new system of granting or leasing lands to individual planters, lands under water are granted at a fixed price or rental.

"The planters are encouraged to make every effort and adopt every improvement which may be expected to increase the quantity and improve the quality of the product. Millions of dollars are invested in the industry. The arch enemy of the oyster and the bane of every planter, the star-fish, is successfully combated; other enemies are effectively dealt with, and numerous unfavorable conditions are met and overcome. Appliances have been improved, and the types of vessels used in the business are constantly bettered.

"Under the local natural bed system, efficient means of destroying the enemies of the shell-fish, involving the use of steamers, was out of the question. Under the present system of state control, the planters may obtain sufficient lands, employ capital to advantage, combat the natural enemies of the shell-fish, and have the benefit of proper surveys and boundaries, the lines being accurately fixed and easily relocated when necessary.

"There is, unfortunately, in some of the towns and villages upon our coast an unprogressive element composed of those who prefer to reap where they have not sown; who rely upon what they term their 'natural rights' to rake where they may choose in the public waters. They deplete, but do not build up! They think because it may be possible to go out upon the waters for a few hours in the twenty-four (when the tide serves) and dig a half peck of shell-fish, that it is sufficient reason why such lands should not be leased by the State to private planters. It might as well be said that it is wrong for the Government to grant homestead farms to settlers because a few blackberries might be plucked upon the lands by any who cared to look for them.

"Though there is an increasing demand for shell-fish, there has been a tendency in many quarters to adopt measures for limiting the supply. For instance, there has been legislation by means of which close seasons have been established, or the size of the shell-fish that may be taken limited, etc., the idea apparently being to conserve the supply. But would it not be better to increase the supply by encouraging the planters to cultivate the many thousands of acres in the State available for this purpose? The objection to granting leases in certain localities has been made that at one time (however remote) natural beds of oysters existed, and that perhaps, if the grounds were allowed to remain idle they might be revived and the natural growers again have an opportunity to gather the product. If this reasoning

were good, it is still true that the exhaustive methods of working which in time past denuded the lands would, if used again, produce a similar result."

The actual condition, therefore, of the Connecticut natural beds is that only four out of the nine are considered to be of sufficient importance to buoy, and of these only a small part of the acreage is now productive. The continuation of the present method of use would soon result, undoubtedly, in complete impoverishment of these beds.

On the other hand a change in the policy by the State towards these beds and the adoption of the leasing system will give an opportunity for the development of these natural oyster-producing areas, following the scientific method used by the private owners, until they would become the largest producing and most valuable oyster grounds in Long Island Sound.

There is an oysterman's story to the effect that one man offered \$60,000 per year as an annual rental for one of the more prolific of the natural beds for a term of five years. While this may be an exaggeration, nevertheless it is an indication of the appreciation of the possibilities of the development of such ground by those sufficiently skillful and experienced to bring it about.

INFORMATION FROM NATURAL GROWTHERS.

In order to secure some approximate information relative to the business of the natural growers, the following blank was sent to all such persons in the State.

To be returned to the Tax Commissioner, Hartford, Conn., on
or before October 1, 1910.

STATE OF CONNECTICUT

Return to the State Board of Equalization.

NATURAL OYSTER GROWTHERS.

Return of

Request for this information authorized in

SPECIAL LAWS NO. 486, SESSION OF 1909.

Section 1. That the state board of equalization be and is hereby appointed a commission to investigate the oyster properties owned by the state, the production thereof, the revenue received

therefrom, trespasses committed thereon, the protection provided therefor, and all things pertaining to the general care and management thereof, and the matter of the valuation and taxation of such properties in this state owned by individuals, firms, and corporations, which commission shall report its findings and recommendations thereon to the next session of the general assembly.

Sec. 2. Said commission is hereby authorized to compel, by subpoena or *capias* issued by any member of said commission or other proper authority, the attendance of any person before it as a witness, and to administer oaths and to cause the production of any papers, books, or maps necessary for the purposes herein provided for, and to punish for contempt to the same extent as justices of the peace may in criminal cases. * * * *

1. Number of years you have worked under license,
2. Your present age,
3. Other business, if any,
4. Names of beds worked each year,
-
5. Names and numbers of boats,
-
6. Do you own your boats?
7. Average number of days you have worked on natural beds each year,
8. Estimated total number of bushels you have taken off during the last five years,
-
9. Average price received per bushel,
10. Portion of product sold to buyers who lived outside the State,
-
- Signed,
- Address,
- Date,, 1910.

State of Connecticut

County of

ss.

Personally appeared the above-named and made oath to the truth of the above statement by him subscribed and of the matters therein contained according to the best of his knowledge, information and belief.

.....*Notary Public.*

Explanations may be written on the back of this sheet; also, remarks relative to protection, trespass, contamination, and changes in the laws relative to any phase of the oyster industry.

Answers were received from sixty-six natural growers and the totals, averages and deductions from the different answers are as follows:

Average number of years in the business	9.13
Average age	45.3
Number admitting to have other business	17
Number claiming to have no other business	49
Number owning one boat	54

Number owning two boats	9
Number owning three boats	4
Number owning no boats	7

The number of days spent working on the ground ranged from 15 to 250, with an average of 98 days.

The total number of bushels taken off in one year by any one person ranged from 180 to 4,000, or a total of 51,888 bushels, being an average of 1,058.9 bushels to each person.

The total number of bushels of oysters taken from the ground in five years was given as 247,655, or an average of 4,953.1 bushels for each person, during five years.

The prices received per bushel for sale of the oysters ranged from 25 cents to 75 cents, or an average of 53.2 cents per bushel.

The receipts per year, per person, were reported to be from \$32.50 to an alleged \$2,550.00, a total of \$26,557.05, or an average of \$603.56 to each person.

Of all the oysters taken from the natural beds those reporting showed an average of 51.8 per cent. of the total as being sold to parties outside of the State. Ten of the natural growers claimed to plant the whole or part of the seed which they caught.

The reports summarized above represented only about a quarter of all the natural growers whose names are listed by the Shell-Fish Commissioners. It is probable that these are the most successful persons engaged in this industry, and that if the other three-fourths could have reported they would have shown small results in every way, and would have reduced the averages and receipts, as given above, to a large extent. This is a definite indication of the comparative small benefit of natural beds to a large number of natural growers.

The industry itself is certainly somewhat of a gamble and, as such, lures many persons to take out a license, in the hope that they will be lucky and draw a prize, but while a few are able to make a good day's wages, a very large number, probably, would be much better off to continue at some definite employment which would bring them at least \$2 per day.

The leasing of ground in small areas will give an opportunity for those of the natural growers who are really oystermen to engage in the business for themselves; cultivate the ground; produce a satisfactory product and derive a very much larger financial benefit than under the present conditions.

PROPOSED LEASING SYSTEM OF THE NATURAL BEDS.

This Board recommends, therefore, that the natural beds within the territory described in section 3214 of the General Statutes be abolished, and such territory be leased to citizens of the State under the following conditions:

Term of lease should not exceed ten years, with the privilege of renewal for another period of ten years. No lease should be made to any one person, individually, or any one person connected with or in the employment of any firm or corporation, for more than twenty-five acres. Preference should be given in granting leases to those persons who for the past five years, consecutively, have held their licenses to work on the natural beds and who live in the locality bordering on such beds. It should be provided that no lease should be transferred or assigned, and in the event of death or termination the lease should be surrendered. It would seem that an annual rental of \$1 per acre in addition to a productivity tax of at least two cents per bushel would be an entirely reasonable and fair return.

There is no question that if such a method were adopted it would raise to a productive state a large amount of ground for oyster culture. It would give an opportunity for increased profits to a large number of persons, with a corresponding increase in revenue to the State for the charges received from such natural beds.

The yearly revenue derived from licenses to work the natural beds and the expense for buoying and inspecting the same since 1895 are given as follows in the Shell-Fish Commissioners' reports:

	<i>Receipts</i>	<i>Expenses</i>
1895	\$695.50	\$ 490.85
1896	860.50	970.83
1897	12.00	1,261.24
1898	860.00	1,103.34
1899	702.00	2,276.42
1900	934.00	1,534.85
1901	547.00	1,945.99
1902	255.50	1,357.86
1903	83.50	1,033.40
1904	676.00	1,096.20
1905	778.00	1,401.24

	<i>Receipts</i>	<i>Expenses</i>
1906	\$ 551.50	\$1,345.05
1907	1,265.00	1,532.50
1908	1,306.50	1,704.45
1909	1,002.00	1,716.70
1910	650.00	1,837.30
TOTALS,	\$11,179.00	\$22,608.22

This shows an average yearly income of \$698.68; an average yearly expense of \$1,413.01; a total net loss for sixteen (16) years of \$11,429.22, and an average yearly loss of \$713.89.

The leasing of such ground at \$1 per acre would theoretically yield \$5,000, annually, and a productivity tax of two cents per bushel on an annual catch of only 200,000 bushels would increase this revenue from a net yearly loss of \$713.89 to a yearly gain of \$9,000. In a comparatively short time this income would be materially changed by the very much larger production which the natural beds would yield under private cultivation.

FEDERAL BUREAU OF CHEMISTRY.

The first public attention throughout the country was drawn to the polluted conditions of many oysters which were being sold in interstate commerce, by the publication in October, 1909, of the now renowned Food Inspection Decision No. 110, by the Bureau of Chemistry, under the direction of Dr. Harvey W. Wiley.

There is given herewith a statement by Dr. George W. Stiles of the Bureau of Chemistry, which is a part of a paper which he has prepared relative to the investigation of oysters shipped from various states together with his recommendations for overcoming the evils connected therewith. Dr. Stiles has personally visited many of the oyster-opening houses in Connecticut. He is known to a large number of our oyster growers. His statement of the case has a special bearing on the oyster industry in Connecticut.

THE BACTERIOLOGICAL EXAMINATION OF SHUCKED AND SHELL OYSTERS.

By GEORGE W. STILES, M.D., PH.D.
Bacteriological Chemist Bureau of Chemistry.
U. S. Department of Agriculture.

During the last quarter of a century rapid developments have taken place along all lines of sanitary science, and nowhere is

this progress more noticeable and striking than in the realm of food bacteriology.

Since the passage of the Pure Food and Drugs Acts in 1905, the need of bacteriology as applied to sanitation has been amply demonstrated. This is particularly true in connection with the production, care, and handling of all kinds of food material, both in their raw and finished state.

The subject of the possibility of oysters and other shell-fish becoming contaminated with sewage-polluted water was one of the first problems to receive consideration after the passage of the Food Law. At the solicitation of a committee representing the North American Oyster Growers and Dealers Association, Dr. H. W. Wiley, Chief of the Bureau of Chemistry, arranged to have the necessary investigation made to study the whole oyster situation. Various phases of the industry were taken up and systematically considered in detail. The writer was instructed to take up the industry from the standpoint of the bacteriologist.

The difficulty causing the greatest annoyance to the Oyster Growers and Dealers Association in the beginning was the moot question as to the best manner of shipping oysters. After the completion of exhaustive experiments, carried on under different commercial conditions, and representing various sections of the oyster-producing territory, the conclusions and results of these investigations, together with public hearings with practical oystermen, were condensed and issued October 15, 1909, in the form of F. I. D. No. 110.

UNITED STATES DEPARTMENT OF AGRICULTURE.

Office of the Secretary.

Board of Food and Drug Inspection

FOOD INSPECTION DECISION 110.

SHELL-FISH.

The Department has investigated the preparation and shipment of oysters, clams, and other shell-fish. A public hearing on this subject was held by the Board of Food and Drug Inspection on May 20, 1909. At this hearing, growers, packers, dealers, and the public were afforded an opportunity to be heard.

It is unlawful to ship or to sell in interstate commerce oysters or other shell-fish taken from insanitary or polluted beds. The pollution of oysters with sewage can readily be detected by bacteriological examination, and such polluted oysters or other shell-fish are adulterated under section 7 of the Food and Drugs Act of June 30, 1906, in that they contain an added "poisonous or other added deleterious ingredient which may render such article injurious to health."

Such articles are likewise adulterated under section 7, in the case of foods, because they consist "in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance."

It is unlawful to ship or sell in interstate commerce oysters or other shell-fish which have become polluted because of packing

under insanitary conditions or being placed in unclean receptacles. In order to prevent pollution during the packing or shipment of oysters, it is necessary to give proper attention to the sanitary condition of the establishment in which they are packed and to use only receptacles which have been thoroughly cleansed as soon as emptied. In order to prevent the possibility of contamination, it is desirable that such containers be sterilized before using.

It is unlawful to ship or sell in interstate commerce oysters or other shell-fish which have been subjected to "floating" or "drinking" in brackish water, or water containing less salt than that in which they are grown. Such food is adulterated under section 7 of the law because a substance "has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength." There can be no objection to "drinking" shell-fish in unpolluted water of the same salt content as that from which they have been removed. Attention is called, however, to the dangers resulting from "drinking" shell-fish near polluted fresh water streams and near other sources of pollution.

It is unlawful to ship or sell in interstate commerce shucked oysters to which water has been added, either directly or in the form of melted ice. Such food is adulterated under section 7 of the act because a "substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength," and also because a "substance has been substituted wholly or in part for the article."

The packing of shell-fish with ice in contact may lead to the absorption by the oyster of a portion of the water formed by the melting ice, thus leading to the adulteration of the oysters with water.

Only unpolluted cold or iced water should be employed in washing shucked shell-fish, and the washing, including chilling, should not continue longer than the minimum time necessary for cleaning and chilling.

In view of the fact that the shipping season has begun and shippers will require several months to provide themselves with suitable containers for the shipment of shell-fish out of contact with ice, no prosecutions will be recommended prior to May 1, 1910, for the shipment or sale in interstate commerce of oysters or other shell-fish because of the addition of water caused solely by shipment in contact with ice.

H. W. WILEY,

F. L. DUNLAP,

GEO. P. McCABE,

Board of Food and Drug Inspection.

Approved:

W. M. HAYS, *Acting Secretary of Agriculture.*
Washington, D. C., October 14, 1909.

From the sanitary point of view the ruling of the Food and Drug Inspection Board makes it unlawful to ship or sell in interstate commerce oysters or other shell-fish taken from polluted beds. This order also made it unlawful to sell or ship in interstate commerce oysters or other shell-fish which have become polluted because of packing under insanitary conditions or being placed in unclean receptacles. It was further considered unlawful to ship or sell in interstate commerce shucked oysters to which

water has been added, either directly or in the form of melted ice. Food Inspection Decision No. 121, an amendment to F. I. D. 110, was issued June 4, 1910, as follows:

UNITED STATES DEPARTMENT OF AGRICULTURE,
Office of the Secretary,

FOOD INSPECTION DECISION 121.

THE FLOATING OF SHELL-FISH.

(Amendment to F. I. D. 110.)

Considerable evidence has been submitted to the Department since the issuance of Food Inspection Decision 110 on the practice of floating or drinking oysters in water of less saline content than that in which they were grown to maturity.

Full consideration has been given to all the hearings and to the briefs, and other information submitted subsequent to the hearings, and the Board is of the opinion that it is not improper to drink oysters in water of a saline content equal to that in which oysters will grow to maturity. If, however, oysters are floated in water of a less saline content than that in which oysters will properly mature, the packages containing such oysters must be very clearly and legibly labeled "Floated Oysters," otherwise they will be considered adulterated under section 7 of the law.

Particular attention should be paid by the growers and handlers of oysters to the character of the water in which the oysters are brought to maturity or floated. Where such waters are polluted it will invariably follow that the oysters will also partake of this pollution and subsequent washing of the oysters, or even floating in water which is not polluted is likely not to cleanse them of this pollution.

Oysters found in interstate commerce in a polluted condition because of the character of the water in which they are grown or floated are adulterated under the Food and Drugs Act.

F. L. DUNLAP,
GEO. P. McCABE,

Board of Food and Drug Inspection.

Approved:

JAMES WILSON, *Secretary of Agriculture.*
Washington, D. C., May 14, 1910.

Having finished our shipping experiments, and concluding that shucked oysters should be no longer shipped or sold with ice in contact, our attention was directed to the more serious aspect, viz: the possibilities of shell-fish pollution from sewage polluted water.

The combined oyster investigations have covered the oyster seasons of 1908, 1909, and 1910, and the writer has personally gone out over the oyster layings, collected samples of water and shell-fish for examination, and at the same time made a careful sanitary inspection of each locality visited. Our investigations have extended from Maine along the Atlantic Coast to the gulf of Mexico. Approximately one thousand samples of oysters, quahaugs, soft clams, and sea water have been collected and

examined bacteriologically during these three years of investigations. These samples represent the product during every step from source of production to consumer.

The contamination of oysters may be explained from any one or more of the following sources:

- (a) Contaminated grounds.
- (b) Polluted water in which they are floated.
- (c) Insanitary shucking houses.
- (d) Washing with impure water and contaminated ice.
- (e) Unclean methods of handling, packing, and shipping.

(a) Vast areas of valuable oyster grounds are admirably located for oyster culture all along the Atlantic Coast. Years ago no difficulty was experienced from pollution by sewage, however the conditions have now changed. Many localities where oysters grow are dangerously polluted, and the extent and seriousness of this pollution will continue to increase as long as man is content to discharge his waste promiscuously into our natural bodies of water. Sewage is the greatest enemy to the progress of the oyster industry. The practical solution of this problem resolves itself into one of two things, either the shell-fish must be removed from the polluted water, or else the untreated sewage must not be allowed to flow into the water over shell-fish layings.

(b) Oysters grown on grounds free from contamination will become infected if floated in sewage polluted water. Many of the recorded epidemics of disease resulting from eating contaminated oysters were caused by oysters which had been previously floated in sewage-polluted water. As ordinarily practiced, the process of floating in water of a questionable purity should be prohibited.

(c) The ordinary oyster shucking establishment is an extremely insanitary place. There are a few modernly constructed buildings, however, fully equipped with sterilizing facilities and proper methods of carrying on such a business where sanitary measures are enforced. Oyster houses should be built and so arranged as to be kept free from cobwebs, dust, filth, etc.

(d) Shucked oysters should be washed with pure water and ice. Contamination may result from this source alone. Natural ice frozen from polluted water will contaminate oysters if placed in the water for washing purposes.

(e) Unclean methods of handling, packing and shipping oysters may result in contamination of the product, even though free from pollution at the beds. All utensils, tubs and other containers used by oystermen should be efficiently cleansed and sterilized by the use of live steam or *boiling* water. Oysters produced and handled under clean conditions, and properly refrigerated, will remain in good condition for several days.

CONCLUSIONS.

(1) Shucked oysters, as ordinarily found on the market, contain more bacteria per given volume of liquor than oysters opened directly from the shell under clean conditions.

(2) The bacterial content of opened market oysters may include numerous *B. coli* and streptococci. Each of these organisms is not only evidence of fecal contamination, but to my mind when present in such large numbers as indicated in table No. 3, their toxins may cause gastro-intestinal derangement of a serious nature if consumed raw by susceptible individuals.

(3) Oysters may be grown on pure grounds and remain in good condition while in the shell, but, because of unclean methods of shucking and handling they may be subsequently contaminated and rendered unfit for food.

(4) There is no assurance that shucked market oysters are always cooked before consumption. They may be served raw on an old shell, in the form of cocktails, on plates, or otherwise.

(5) Oysters intended for human consumption should be grown in water free from pollution, and the greatest care should be exercised to keep such a product in a clean and wholesome condition until consumed.

STATE BOARD OF HEALTH.

The strict requirements of the Department of Agriculture as defined in Food Inspection Decision No. 110, relative to the floating or drinking of oysters to be sold in interstate commerce, or the maturing of the same in polluted waters, in the opinion of the Board required special consideration in its connection with the Connecticut oyster industry.

A large number of the oyster growers had expressed themselves as being very desirous of conforming strictly to the federal regulations. While it is apparent that certain of the river and harbor waters are largely polluted by sewage, it is a well-known fact that a large area of the Connecticut oyster ground is absolutely free from any contamination, and perfectly proper to be used in the oyster industry. It is not fair to the reputable oyster growers to assume that all the waters covering oyster lands in Connecticut are polluted, neither is it fair to the public to assume that all oysters grown or taken from Connecticut waters are absolutely free from contamination. It seemed to the Board very necessary, therefore, both in the interest of the honest oyster growers, as well as to the public, to have official

determination by proper and competent authority of the condition of the various harbor and coastal waters in proximity to the oyster grounds.

The proper body to make such investigations, which would be received with confidence by all concerned, is the State Board of Health. The Board decided to request it to make such an investigation and to that end addressed to it the following letter in April, 1910:

April 13, 1910.

THE HONORABLE STATE BOARD OF HEALTH,
Capitol,
Hartford, Conn.

Gentlemen:

The pure food and drug committee of the Department of Agriculture at Washington have made certain rulings relative to oysters shipped in interstate trade, which seriously affect the oyster industry in this State.

These rulings prohibit the shipment of oysters that are gathered from waters that are polluted by sewage contamination. They also prohibit the drinking of oysters in such waters, and prescribe that if floated, it shall be done in water of the same salt content in which they are grown.

While this committee is explicit in their prohibitions, they are not at all definite in their suggestions as to how these alleged dangers may be overcome; nor do they give any definite standard of purity which the water must be in order to be used for the growing of oysters. Neither do they state definitely the standard of salt content which is acceptable.

The Board of Equalization, acting as a special commission for the investigation of oyster properties of this State, under Chapter 486 of the Special Acts of 1909, has held public hearings in Bridgeport, South Norwalk and New Haven, and has discussed freely with the oyster planters the rulings of this committee, together with the serious difficulties which almost menace their industry on account of the contamination of the rivers and harbors by sewage, and the waste products of manufactories.

At a meeting of the Board of Equalization, held yesterday, I was instructed to request your honorable body to make analyses, as soon as possible, of samples of streams, and harbor waters near New Haven, Bridgeport, Norwalk, and possibly other points along the coast, also analyses of oysters floated in those waters, and, in addition, to secure similar data relative to waters and oysters in other sections of the so-called oyster grounds, so that there may be an official statement as to what waters are satisfactory for the growth and floating of oysters in this State.

The oyster planters have assured this Commission that if such official information can be secured, they will use their endeavors

to adapt themselves to present conditions until further relief can be secured.

The Board also requests that you suggest, at your convenience, legislation which would be sufficiently practical, so that it could be enforced, to remove as much as possible the sewage contamination which exists at present, and to prevent further contamination in the future.

The Board asks that action be taken at your next meeting on our request for the official analyses of the waters, for it is very desirable that definite information relative to this matter be secured as soon as possible.

Yours very truly,

WM. H. CORBIN, *Tax Commissioner.*

Early in December the following letter was received giving action of the Board and the results of the investigations which were made in New Haven Harbor:

CONNECTICUT STATE BOARD OF HEALTH.

December 10, 1910.

BOARD OF EQUALIZATION AND OYSTER INVESTIGATION COMMISSION,
Hartford, Conn.

Gentlemen:

In response to your request contained in letter of April 13, from Mr. Wm. H. Corbin, Tax Commissioner, that the State Board of Health would make analyses of the harbor waters and streams near New Haven, Bridgeport, Norwalk and other points along the coast, also analyses of oysters floated in those waters, the board at its quarterly meeting in April appointed a committee consisting of Dr. A. J. Wolff, Mr. T. H. McKenzie, Professor H. W. Conn, Bacteriologist, and the Secretary to consider the matter and report to the Board at a special meeting to be held as soon as the Committee was ready to report.

This committee held several sessions and at a special meeting of the Board held in June reported that this investigation was one that ought to be taken up by the State Board of Health, and recommended that it be done.

The Board accepted the report and recommendation of the committee and authorized our chemist, Mr. James A. Newlands, and Mr. George C. Ham, Civil Engineer, to undertake the work of investigation. It was decided, owing to the magnitude of the work and the limited resources at our disposal, that the work, for the present summer be confined to New Haven Harbor.

The work as authorized was carried on from June until October and at a special meeting held December 8, Mr. Newlands and Mr. Ham made a report to the Board of their summer's work.

This report, while not regarded as complete, was accepted as a report of progress, and in accordance with a vote passed at this meeting, I herewith transmit to you a copy of said report.

Very truly yours,

JOSEPH H. TOWNSEND, *Secretary.*

The report in full is given on page 109. The work of investigation in New Haven Harbor occupied the time of Mr. Newlands and Mr. Ham nearly all summer.

Observations and experiments were made at various stages of high and low water with different air currents. The percentage of land water to sea water was also determined. The direction of the flow of each one of the main sewers was determined. Analyses were made of the waters of the harbors and rivers, at various depths, and also of the oyster liquor. Out of the total area of over 2,000 acres of private oyster grounds in New Haven Harbor 1506 acres showed definite evidences of the presence of sewage pollution which should not be used for growing market oysters and 579 acres in addition would require further investigation before any definite statement can be made. Probably the contiguous natural beds are as much contaminated.

POLLUTED GROUNDS.

Oyster culture is carried on in Connecticut on a large scale and with an intelligence and enterprise not exceeded by that shown in any other state. It has become such a great and important industry that it should be wisely fostered by the State. It uses so much capital, it employs so many persons, it produces such large quantities of a food product which is so much sought for and widely consumed, that the promotion and protection of the industry should be encouraged and aided. The State should free it from any unjust suspicion and safeguard it from being a public danger by adopting measures for protecting the oyster grounds from sewage contamination. That the harbors along the coast, where oysters are grown, are seriously polluted by sewers discharging at points which have been taken because most convenient without any regard to the development of local nuisances, or the dangers to persons eating oysters from such grounds, is shown by the recent investigation in New Haven Harbor made by the State Board of Health. During the examination of oyster

beds in all localities where the beds were infected it was found that the infection was due to sewage, and there are many other oyster beds in this State so located that with the growth of the adjacent towns the sewage, unless proper precautions are taken, will destroy the commercial value of such beds. Aside from the pollution of our oyster beds the indiscriminate discharge of crude sewage into our streams and harbors is no doubt a potent factor in the spread of communicable diseases and is a source of complaint from the owners of shore property.

The problems connected with sewage disposal are very complex and vary with the conditions of the case under consideration, as a method which may be applicable at one point will be totally unfit for another. Many of the sewerage systems of the State have been built without any adequate conception of what the plant was expected to do, or what should be done, and are, therefore, inefficient.

Another problem relating to public water supplies is always apparent, whether it is more economical to thoroughly purify sewage, or more economical to purify the water which may be polluted by such sewage. These are problems which cannot be determined, ordinarily, by the city or town involved and it seems too often to be the attitude of cities to think, if they can get their sewage from their city, that it is immaterial what happens to some other town.

All these considerations make it apparent that the matter of sewage disposal should be placed in the hands of some central body properly equipped with the necessary machinery for dealing with the subject, efficiently, fairly and economically, and the Board believes, as this is preëminently a question of public health, this control should be placed with the State Board of Health.

Massachusetts, New York, New Jersey, Kansas, Pennsylvania, Ohio, Indiana and Vermont have given their state boards of health quite definite powers in the regulation of sewage disposal and the protection of water supplies, and their example might well be followed.

The examination of the water outside of New Haven Harbor to the south of the Breakwater showed the same to be sufficiently free from colon bacilli to be entirely satisfactory for both growing and maturing oysters for interstate trade. It is not fair to

the owners of this ground to include the sweeping assertion that their ground is unfit for oyster cultivation as being near New Haven.

There should be some state authority, preferably the State Board of Health, to certify to the condition of all oyster grounds that are above reproach, and also to prevent the sale, in the various towns of the State, of oysters taken from polluted waters. The Board of Health of New Haven has such a regulation, but there is no prohibition against shipping such oysters which are shut out of New Haven to any other town in the State. (Page 99.)

The Board definitely recommends that the State Board of Health be specifically empowered to continue the investigation of the condition of the harbors and coastal waters of this State, which are in proximity to oyster-producing grounds, including the natural oyster beds.

It is recommended further that the Board be authorized to give certificates attesting to the purity of whatever grounds are satisfactory for the maturing of oysters for the market. Certificates should be withheld from all other oyster grounds, in fact the State Board of Health should forbid taking oysters from polluted beds for the market, as is prohibited in Rhode Island and other states.

OPENING HOUSES.

The Board inspected a number of the buildings in different localities in the State where oysters were opened. This visit was made during Thanksgiving week of this year, at the time when there is the largest demand for oysters. An opportunity was thus given to inspect the method of operation, and the conditions of the work rooms at the time of their greatest use. In some of the houses men and women are employed, and in others colored men, most of whom have worked as "shuckers" in Maryland and Virginia.

The following description has been given of this work:

"The method used in opening the shell is known as 'breaking' or 'cracking.' The shucker stands or sits before a stout bench, which may be a long table partitioned off into working spaces for each one, and before whom the oysters are piled. Immediately under his hand is a block of wood into which is inserted

an upright piece of iron called the 'cracking iron.' The shucker is also provided with a double-headed hammer and a stiff, sharp knife on a round wooden handle. On the left hand is worn a rough woolen, rubber, or leathern half-mitten known as a 'cot' to protect the skin. He seizes an oyster with the left hand with the hinge in the palm, it is placed upon the cracking iron and with one blow of the hammer the 'bill' or growing edge of the shell is broken off. In the fracture thus made the strong knife is pushed back until it cuts off the muscle attachment. The meat is then tossed into the receptacle which stands ready, and the shells are dropped through a hole in the bench to a barrel or tub placed underneath. The oysters as fast as opened are flung into a tin receptacle called the 'measure' holding a gallon or more. Much of the oyster liquor also goes in with the meat and when the measure is filled it is taken to the foreman and poured into the 'skimmer,' the shucker receiving in exchange a brass check entitling him to a definite payment for each quart. In some cases the liquor is strained. If the liquor is strained out, only about two-thirds of the measure would be filled. As soon as the oysters are opened they are placed in the flat pan called the 'skimmer' while they are drained from their accompanying liquor. They are then put into a large colander with perforated sides, where a stream of water is turned upon them and they are stirred about until washed clean. They are then put into a tin receptacle for shipment."

During all this process the meats of the oysters are liable to be contaminated or polluted by contact with dirty hands, foul receptacles, and impure water. In view of the fact that these oyster meats are often eaten raw, just as received from the dealer, all of the above is a very serious matter. Since the advent of the disclosures made by Dr. Harvey W. Wiley, chief of the Bureau of Chemistry, as the result of inspection of oysters shipped in interstate trade, attention has been called to the cause of contamination and very great improvement has been made in handling the product before shipment. Dr. Wiley's jurisdiction, however, applies only to interstate commerce and there is no ban whatever on intertown shipment within the State.

The visit of the Board to the oyster opening houses showed quite a large diversity in the methods and care of handling the oyster meats. In some houses the opening took place in old

wooden buildings with dusty rafters, wooden floors and benches, many of them in a dirty condition with the wood saturated with the oyster liquor. In these houses there was no uniformity in the use of proper aprons and hand coverings to prevent contact with soiled clothes and hands. Hot water and steam for cleansing and sterilizing were not in evidence. The general lack of cleanliness which was quite apparent gave the impression that there should be some form of inspection which would require more cleanly conditions in handling this food product, which may be eaten without sufficient cooking, to destroy any harmful germs.

On the other hand, oyster opening houses situated elsewhere in the State seemed to be entirely satisfactory in their appearance, in the remarkable cleanliness and in the evident care in handling the product. The construction of the buildings and the renewed white paint made it impossible for a large amount of dirt to be in evidence. The floors were of cement and were frequently washed. The shell oysters were conveyed to the shuckers by the gravity system, coming from large overhead storage bins. After shucking, the shells were dropped through a hole in the bench and in some cases were removed by an endless belt which obviated the possibility of dust and dirt from the handling of baskets. A large amount of pure water was in evidence in its use for cleaning the meats and sorting them into the various commercial sizes.

In these houses the shuckers were uniformly dressed in long white aprons and the hands were well covered. Strainers were used as receptacles and the shuckers were paid by solid measure. The general impression from inspecting such an opening house was one which inspired confidence in the use of oysters as a food product and if known by users would certainly increase the demand for and sale of such oysters. If certain oyster-growing firms consider it advisable and even necessary to conduct their business along such lines of cleanliness and sanitation, it is clearly evident that such precautions are desirable, both from the standpoint of the producer and the consumer.

In the opinion of the Board there should be a state law which requires the State Board of Health or its agents to inspect, as frequently as it may determine, all the opening houses in the State, and secure a proper and uniform method of opening, handling, and cleaning oysters that are sold for trade, either

within or without the State of Connecticut. Such a requirement would be of great benefit by creating an increased confidence in the oyster as a food product and would make it known throughout the country that all oysters opened in Connecticut were uncontaminated by deleterious substances, and could be used very freely by all consumers. All reasonable oyster growers would welcome such inspection and the others should be made to conform. The increased business which would result would more than cover any additional expense which would be required to maintain the standard which would be imposed by the Board of Health.

In such inspection it is recommended that the "score card system" be used similar to that employed by the Government in the inspection of dairies by the Agricultural Department as shown on page 92 and that the definite method to follow closely be that of Rhode Island's, see page 94.

The requirements for cleanliness should be something like those required in Rhode Island or Virginia, given on pages 95 and 100.

CONFERENCES.

National Association of Shell-Fish Commissioners.

By appointment of Governor Weeks, the Tax Commissioner, as the special representative of Connecticut, attended the second annual convention of the National Association of Shell-Fish Commissioners, at Mobile, Ala., on April 19, 20, and 21, 1910. Members of the Shell-Fish Commissions and other delegates from all the oyster-growing states were present.

Very instructive papers were read, as follows:

"Oyster and Clam Culture in the North American States," by Mr. B. Frank Wood, Supt., Bureau of Marine Fisheries, New York.

"Oyster Culture in the Gulf States," by Mr. J. A. Joullian, Secretary Oyster Commission of Alabama.

"Some Sanitary Considerations in Connection with the Treatment of Oysters," by Dr. W. D. Bigelow, Bureau of Chemistry, Washington, D. C.

"The Cultivation of the Oyster in North Carolina," by Dr. J. H. Pratt, State Geologist of North Carolina.

"Scientific Experiments in Oyster Culture," by Dr. Julius Nelson, Biologist of the New Jersey Bureau of Shell-Fisheries.

An illustrated lecture on "The Oyster," by Mr. Swepson Earle, Hydrographic Engineer for Maryland Shell-Fish Commission.

A Symposium—topic, "How may the Public Oyster Lands of a State be Best Administered for the Greatest Good of the Whole State?" by Samuel F. Bowden, Shell-Fisheries Commissioner of Rhode Island; Charles Wythe, Hydrographic Engineer, Forest, Fish and Game Commission, New York; and William H. Corbin, Tax Commissioner of Connecticut.

Many practical suggestions were received from the papers and discussions of the subjects, which have been of great help to the Board in formulating its conclusions, which are presented in this report.

The following resolutions were unanimously adopted:

WHEREAS, The Shell-Fish Industry of the United States has the possibility of being one of the most important in the country both commercially and as a food-producing agent; and

WHEREAS, The National Association of Shell-Fish Commissioners recognizes the paramount importance of insuring public confidence in the purity and healthfulness of the shell-fish supply; and

WHEREAS, There has developed in the United States during recent years a marked tendency to improve the sanitary conditions attending the cultivation, handling, shipment and sale of oysters and other shell-fish;

BE IT RESOLVED, that the Association expresses its gratification at the steps that have been taken to this end by federal and state authorities and by many firms and individuals interested in the Shell-Fish business, and

BE IT RESOLVED, that the Association, hereby goes on record as being in hearty accord with the efforts of the Federal Department of Agriculture to insure to the general public an absolute standard of purity in all oysters and other Shell-Fish used in interstate trade and in the steps taken by that Department in the enforcement of the Food and Drugs Act; and

BE IT RESOLVED FURTHER, that this Association, through the delegates representing the Shell-Fish Authorities of the different states, use its influence for the removal from all streams and coastal waters of sources of pollution which may be prejudicial to human health or to the development of shell-fish.

By unanimous rising vote, Dr. Harvey W. Wiley, Chief of the United States Bureau of Chemistry, was elected an honorary member of the Association.

ANNUAL MEETING OF THE OYSTER GROWERS AND DEALERS ASSOCIATION OF NORTH AMERICA.

By vote of the Board of Equalization, the Tax Commissioner attended the second annual meeting of the Oyster Growers and Dealers' Association of North America, at Norfolk, Va., May 17 and 18, 1910.

There was a large attendance, probably over three hundred, from all the oyster-producing states in the country, also many jobbers and dealers from the interior states.

The following papers were read:

Address—"The National Pure Food Law as Applied to Oysters," by Dr. G. W. Stiles, Bureau of Chemistry, Washington, D. C.

Address—"The National Pure Food Law from the Standpoint of a Practical Oysterman," by Mr. Fred S. Beardsley, Manager of the Stratford Oyster Company, Stratford, Conn.

Address—"A Commonsense View of the Pure Food Situation as between the Scientist and the Oysterman," by Dr. Herbert D. Pease, Bacteriologist of the Lederle Laboratories, formerly on New York Board of Health, New York City.

Address—"Scientific Oyster Culture and the Need of Public Education Respecting the Oyster Industry," by Dr. H. F. Moore, oyster expert of the Bureau of Fisheries, Washington, D. C.

In addition, many matters were discussed and a large number of questions asked based on suggestions inspired by the several papers.

The meeting was very emphatic in the sentiment that the pollution of streams and harbors should be prevented by the state. Mr. N. S. Ackerly, of Northport, N. Y., stated that land under public waters is the property of the owner by legislative authority, and the municipality has no right to invade the private rights of the individual by the deposit of sewage there. He stated that there were two leading court cases on the pollution of streams.

State of Missouri, St. Louis vs. Illinois, 200 U. S.,
pp. 496.

Huffmire vs. Brooklyn, 162 N. Y., pp. 584.

New York Court of Appeals, 175 N. Y., pp. 346,
Sammons vs. Gloversville.

The latter case applied specifically to oysters. A number of cases in state and circuit courts have been tried, with decisions that contamination must be stopped.

Mr. Beardsley's paper was an energetic statement of the application of the federal requirements from the standpoint of a practical oysterman. He claimed that the standards of purity and salt content should be definitely established, and that the prohibition of floating in water of a less content than the water in which the oysters were grown was unreasonable. The entire paper was very interesting and practical and has been published in full by the *Bridgeport Standard*.

Dr. Pease read a very interesting paper treating particularly the alleged dangers from the use of oysters. He said that it was positively known that infected oysters had produced typhoid fever. His paper gave very valuable suggestions for the use of the State Board of Health.

He stated that neither colon bacilli nor typhoid bacilli grew in oysters, although they can exist there. Greater danger exists from contamination of a single house near an oyster bed than from a large volume of sewage which flows over the ground in a large volume of water. There would be very few cases of infection by typhoid pollution if oysters were taken directly from the growing grounds and delivered to the consumer. Nearly all cases of infection have come from oysters that have been transferred to other waters and floated, and then delivered. Each state should have definite results of bacteriological study and sanitary survey.

No case had been found where there had been any infection of oysters which had not been floated in other waters than those in which they were grown. Great care should be taken in the discharge of any sewage by oyster boats while working on the beds. The colon bacillus is always present in the digestive tracts of human beings. This is not necessarily, however, productive of disease, but may possibly be.

The general public is not yet greatly interested in the proper disposal of sewage, or the contamination of oyster beds, and should be educated along these lines.

Dr. H. F. Moore's paper was a very interesting discussion of the production of oysters, giving very valuable suggestions as to methods and details of the oyster industry.

The resolutions unanimously adopted at this convention were as follows:

WHEREAS, An unfounded prejudice has heretofore existed in the minds of some of the public against the healthfulness of the oyster, which has had a tendency to curtail its use as a desirable article of food, and

WHEREAS, The Federal Department of Agriculture, under the leadership of Dr. Harvey W. Wiley, has adopted rules to insure a high standard of purity in the production and distribution of oysters for consumption in all parts of the country. Be it, therefore,

RESOLVED, That the Oyster Growers and Dealers Association of North America, in convention assembled, desires to go on record as favoring any and all definite and reasonable measures that may be adopted by the federal or any state authority to secure the conduct of the business on absolutely sanitary lines—and this association further pledges itself to do anything in its power to produce and distribute only oysters which are wholesome and absolutely safe for the use of any or all people of this great country, and to coöperate with all national and state officials to guarantee such results. And be it further

RESOLVED, That this body respectfully suggests to the pure food authorities of the various states, for the sake of the benefits to be derived through uniform ruling, that they base the interpretation of all state pure food laws, as same pertain to the oyster business, upon the provisions decided upon by the National Department of Agriculture as outlined in Pure Food Decision No. 110. And be it further

PROVIDED, That the Secretary of this association be instructed to file copies of these resolutions with the health commissioners of every state and with the National Board of Food and Drug Inspection.

DR. HARVEY W. WILEY.

On the way to Mobile the Tax Commissioner had an interview with Dr. Harvey W. Wiley, Chief of the Bureau of Chemistry, at Washington, relative to order F. I. D. No. 110 of the Agricultural Department, regarding the growing of oysters in polluted waters and the practice of floating oysters.

He stated that while certain oyster dealers claim that the practice of "floating" or "drinking" oysters is necessary to cleanse them from impurities, the real purpose is to bloat them by floating in fresher water than that in which they were grown. The process of endosmosis then takes place and the oyster becomes bloated or enlarged.

While the claim is made that the floated oyster is desired by the trade, Dr. Wiley is of the opinion that it would not be so if the trade only knew the taste and appearance of the natural oyster. While the former is white, bloated, and tasteless, the latter is a little yellow in color, salty, and tasty in the natural size, and when familiar with it, is more acceptable to the general public.

Dr. Wiley stated that pure food always means larger business to the producer, and the same result would be evident as soon as the oyster growers adapted themselves to the new regulations of the agricultural department regarding oysters shipped in interstate trade.

He stated that oysters grow better in the fresher waters, and also in waters that are contaminated, as there seems to be more diatoms on which to feed. An oyster, however, will clear itself of any impurities in a comparatively short time, and it is perfectly proper to grow seed oysters in any polluted waters, if the oysters are transferred to other oyster grounds where the water is uncontaminated. In this pure water they will free themselves entirely from all impurities in one or two months. If any floating is to be done, it should be in the waters over these beds, which may be a little less salty and freer from impurities.

He stated that the food and drugs act used the expression, "Anything that may be injurious to the health," and there is no doubt but colon bacilli are injurious to the health, whether or not they contain typhoid germs.

He stated that it is very desirable that the State Board of Health have jurisdiction over a certain part of the oyster industry, so that they may make examinations of all waters in which oysters are grown and also insist upon a proper standard of cleanliness in the oyster-opening houses, and in all the implements and receptacles used in the industry. It was stated that the standard of purity of waters, in which oysters are matured for shipment, should not be less than the standard required in drinking water.

Dr. Wiley stated that he and the other chemists of the Bureau would be very willing to coöperate with the authorities of Connecticut in an endeavor to remove all cause of suspicion in connection with the Connecticut oyster industry. He stated further that some oysters which were sent to him, as having been

grown and matured on certain Connecticut oyster ground, were the nicest he had ever eaten, and his friends confirmed this opinion.

SCIENTIFIC INVESTIGATION OF OYSTER GROWING.

Because of the importance of the industry at present and its future possibilities, together with the amount of revenue to be derived therefrom, the State of Connecticut is under obligations to the oyster industry of the State not only to require all reasonable precautions to prevent contamination of harbor and coastal waters, but in addition to provide some means for the scientific investigation of the proper conditions to secure the best possible results in the growth of oysters in Connecticut waters, similar to the investigations carried on for the benefit of the agricultural interests. Such information relative to the cause of the green color, the failure of sets, best methods for securing proper growth, effective means of exterminating enemies, etc., should be available for the benefit of all those engaged in the oyster industry, and should not be confined to the individual planters, as the possible result of their own experience. Several of the coast states have made considerable progress along these lines, and much definite benefit to the oyster industry has resulted through such scientific investigations.

The Board was of the opinion that the Connecticut Agricultural Experiment Station in New Haven, under the direction of Dr. E. H. Jenkins, would be best fitted for such investigation on account of its location and equipment. The matter was taken up with Dr. Jenkins, and the following letter relative thereto was received from him:

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION.

New Haven, Conn., December 12, 1910.

W. H. CORBIN, *Tax Commissioner*,
State Capitol, Hartford, Conn.

My dear Mr. Corbin:—

I have been considering the subject of oyster investigation which you suggested to me the other night. Such biological work is, of course, quite out of the direct line of our present work, and yet, with suitable provision for it, we could arrange to have it done at this station; but on thinking the matter over, it occurred to me that the work could be much more conveniently and thoroughly done by the biological department of the Sheffield Scientific School. I understand that arrangements are now being completed for a marine laboratory, at least the land has been already purchased.

Professor Verrill and others who have been in that department of Yale have done an immense amount of work in the study of marine life and my own feeling is that no other institution or agency in the State has anything like the facilities which Yale affords, nor can the necessary knowledge for the work be as conveniently supplied elsewhere. I, therefore, took the liberty this morning of calling up my friend, Director R. H. Chittenden, of the School, and suggested the matter to him. He told me that it appealed to him as a kind of work which would be eminently appropriate for their marine laboratory and he would very much like to be in communication with you, personally, on the subject. If, therefore, this suggestion seems to you worth following, will you kindly communicate with him directly? Of course, if you prefer to have the Station engaged in it, I shall be glad to meet you for further conference.

Very truly yours,

E. H. JENKINS.

As suggested by Dr. Jenkins, a conference was held with Director Chittenden of the Sheffield Scientific School. He expressed his interest in the plan and his confidence that definite benefit to the oyster industry would result by such action with a small expenditure of money. He announced that the Sheffield Scientific School expects in time to have a well-equipped marine laboratory at Savin Rock, where facilities for the work needed to be done in such an investigation would be provided. In the meantime the present laboratory may be used. He stated that the expense of such work for the State would be very small when carried on in connection with the regular work of the marine laboratory.

At the request of the Board he later submitted the following statement prepared by Professor Wesley R. Coe, professor of biology at the Sheffield Scientific School, relative to the field of investigation which might be covered:

It is now more than a half century since the cultivation of oysters by artificial methods has been successfully practiced in the waters of the State, and although the industry has grown to comparatively vast proportions its success has been due to a combination of good judgment and skillful management on the part of the planters, accompanied with the most favorable natural conditions, rather than to any considerable encouragement on the part of the State or national government.

And although there is every reason to be proud of the reputation which Long Island Sound has acquired, as one of the foremost oyster-growing localities of the world, the experience of other Atlantic states and other countries, particularly of France, renders it practically certain that the remarkably favor-

able natural conditions for the growth of the oyster are but incompletely utilized. With the present ever-increasing demand for bivalves of the best quality and guaranteed purity, the State of Connecticut should no longer delay the fullest possible development of the wonderful natural resources of her shell-fisheries.

Other countries and other States where the natural conditions for oyster growing are far less favorable than here have long since awakened to the advantages to be derived from a scientific investigation into the biological conditions under which the oyster grows, and have profited enormously in so doing. And while the results of those studies are freely at the disposal of our own oyster growers, yet it must be constantly borne in mind, that although the same oyster may be grown either in Chesapeake Bay or Long Island Sound, the conditions which surround it, especially as regards food and natural enemies, are very different in the two localities.

It may thus happen that a method of culture successful in one region may result in failure if practiced elsewhere. Hence it will not be safe for our planters to follow blindly the course of culture and protection which has been found satisfactory in Maryland, or New York, or Rhode Island.

The oyster grower knows that a difference of a few days in the time when the shells are laid down for the reception of the spat may make a profound difference in the set of young oysters. For the best spawning period of the oyster in one locality lasts but for a few days—perhaps two weeks—and the free-swimming young, after remaining from one to two days at the surface of the water, are forced to settle to the bottom, where they invariably perish unless they are able to attach themselves to some hard surface suitable for their reception. To supply suitable materials for the attachment of these young oysters, the planters commonly cover the bottom of their leased areas with the shells which remain from the oysters opened the previous season. Sometimes the set of young oysters on these shells is successful and sometimes not, and this in spite of the fact that the water was teeming with spawn in the breeding season. The supply of spawn is always sufficiently abundant when mature oysters are growing in the immediate vicinity, for a single female oyster may discharge several millions of eggs. Why, then, the failure of the spawn to set?

Recent investigations have shown that the dead shells when spread for the reception of the spawn quickly, sometimes even in the course of a few days, become covered with a slimy deposit of such a nature as to prevent the attachment of the young oyster. Hence the importance of knowing with certainty the average time of spawning for each locality, for if the shells are spread too early the set may fail and if spread too late may be insufficient.

Then again, take the natural enemies of the oyster. Less than one egg in a million succeeds in developing into a mature oyster. What, besides the lack of sufficient material to receive the spat when the spawn settles to the bottom, causes such wholesale destruction of these creatures? Are changes in the temperature of the water responsible? Or salinity? Or scarcity of food? Or over-crowding? Or smothering by accumulations of mud? Or are there many other animals which, naturally feed on the growing oyster? We may answer that all these agencies, and doubtless others play their parts, and the further development of the oyster industry of the State must depend in large measure on the determination of means by which this destruction may be to some extent mitigated.

Given normal conditions, a small fraction of one per cent. of the free-swimming embryos will escape such enemies and other destructive agencies, as they encounter in this stage of their existence, and will succeed in establishing themselves upon suitable objects and begin to grow. As the young oyster increases in size other enemies appear on every hand; fish, molluscs, and star-fish await it. The few which escape may grow for a year or two, or more, and then fall a prey to the ravages of drill or star-fish. Of the enemies of the fully grown oyster the star-fish is by far the deadliest, and the planter knows that his oyster bed can be saved only by his continual vigilance.

Nowhere in the world is the star-fish so destructive to the oyster as in Long Island Sound and Narragansett Bay. Any discoveries that could abate this nuisance would be worth more to the oyster-growing interests of the State than the cost of a fully equipped biological station for a century.

It is not expected that any such complete success will come from the establishment of such a station, any more than the agricultural interests of the State expect that the San José scale or the potato beetle will be exterminated by the state entomologist, but it is a well-demonstrated fact that the money expended on insect investigations is returned tenfold to people of the State, and that without such investigations successful agriculture would hardly be possible.

And while far-reaching discoveries are not promised in the contemplated biological station, it is expected that investigations of value will be made. Information regarding any of the following topics can hardly fail to be of service:

(a) The possibility of considerably extending the present limits of the oyster beds both by experimentation with new areas and by artificial means such as the use of sand, shells, brush, tile, or by changing somewhat the topography of the bottom, make certain hitherto unsuitable areas available.

(b) By determining accurately the height of the spawning season in several localities during a series of years.

(c) By improved methods of collecting spat for planting in different localities.

(d) In utilizing the sewage-polluted areas of harbors, teeming with food for the young oysters, to be subsequently transplanted to the pure waters of the Sound.

(e) In determining, bacteriologically, what areas are polluted and hence unfitted for market oysters.

(f) In recommending sanitary precautions which will tend to inspire public confidence in the healthfulness and safety of this most delicious food, at present so commonly looked upon with suspicion and by many refused altogether unless cooked.

(g) In a biological study of the food supply of various localities both for oysters and clams.

(h) In investigating the enemies and other destructive agencies of the spawn, spat, and young oyster.

(i) In a biological study of the drill and other molluscan enemies.

(j) In a biological study of the star-fish, and the utilization of means for holding it in check.

These are but a portion of the problems which would naturally be undertaken by such a biological station during a series of years. The results are certain to be a value far in excess of the small outlay necessary for its maintenance, for accurate information on a single one of the topics, suggested above, would enable the oyster planter to take advantage of opportunities for economy and profit of which he is now deprived because the conditions are unknown.

No less certain to yield profitable returns are investigations regarding the culture of the two species of clams, which should become a much more important industry than is at present the case.

And finally, there is no other locality in the State so favorable for the prosecution of these studies as New Haven, situated as it is in the very center of the coast, the seat of our greatest oyster-growing system, and with the extensive laboratory facilities and libraries of Yale available for biological and bacteriological studies. Already the Sheffield Scientific School has secured a plot of land at Savin Rock favorably situated for such a station for which plans have been in progress for several years.

The state of New Jersey has conducted such research work for several years under the direction of Dr. Julius Nelson, professor of biology at Rutgers College, and has obtained very satisfactory results. The act providing for the same is as follows:

An act to amend an act entitled "An act to provide for the scientific investigation of oyster propagation," approved March twenty-first, one thousand nine hundred and one.

Be it enacted by the Senate and General Assembly of the State of New Jersey:

1. The director of the New Jersey Agricultural College Experiment Station at New Brunswick is hereby authorized to establish and to maintain one or more stations for the scientific investigation of oyster propagation and other ostreacultural problems, said station or stations to be situated at some point or points in the oyster-growing sections of this state; to procure a boat or boats adapted to the prosecution of the aforementioned research work; to have the same equipped with suitable apparatus; to engage such expert or experts and the services of such other persons as may be needed in the maintenance of the ostreacultural studies so undertaken, and to transmit, annually, to the governor a full and detailed report of the scientific operations under this act in the reports of the agricultural college experiment stations; the amount authorized to be expended under the provisions of this act shall not exceed the sum of twelve hundred dollars in any one year; provided, that no moneys shall be drawn from the state treasury for the purpose of this act until the same shall have been specifically appropriated according to law.

2. This act shall take effect immediately.

The Board recommends that a portion of the money now spent for oyster police, inspectors of dumping, and buoying the natural beds be appropriated for the conduct of a scientific investigation of oyster propagation, under the direction of Director R. H. Chittenden of the Sheffield Scientific School; the results of which ought to be very advantageous to the oyster industry in general in its returns to the State and to the different individuals engaged in the business in the profits accruing to themselves.

It is recommended that an appropriation of eight hundred dollars per annum be made for such work.

NONRESIDENT HOLDINGS OF OYSTER FRANCHISES

Section 3215, of the General Statutes, as amended by Chapter 66 of Public Acts of 1907, provides:

Said commissioners shall also be empowered, in the name and behalf of the state, to grant by written instruments, for the purpose of planting and cultivating shell-fish, perpetual franchises in such undesignated grounds within said area as are not and for ten years have not been natural clam or oyster beds, whenever application in writing is made to them through their clerk by any

person or persons *who have resided in the state not less than one year next preceding the date of said application, or by any joint stock company or corporation organized under the laws of this state, all the stockholders of which are citizens of this state.*

(The italics are used for emphasis.)

This statute was apparently the outcome of a requirement made in 1848, that any person who had not been an actual inhabitant or resident for six months next preceding, should not take, rake, or gather any oysters in any of the rivers, bays, or waters of this State. Such restrictions were continued when definite franchise grants were made to private owners. Now that a large number of the oyster properties are owned by corporations, the specific requirement of the statute, that all the stockholders must be citizens of this State, is almost impossible to carry out.

The General Assembly of 1907 passed the following bill, validating the designation of shell-fish grounds:

All designations heretofore made by the Shell-Fish Commissioners to any persons, including nonresidents, of grounds for the purpose of planting and cultivating shell-fish, and all transfers of such grounds to any person or corporation, including nonresidents, are hereby validated and confirmed.

As stated in the report of the Shell-Fish Commissioners, a measure similar in its character to the above was passed by the New York legislature, whereby all Connecticut holders of shell-fish grounds in Suffolk County, N. Y., were confirmed in their titles up to that date, and as there were then large interests in both states held by nonresidents, a thing technically contrary to the laws of both states, these enactments remove any cloud resting upon such titles up to that time and validate and confirm such valuable holdings. Since 1907 other transfers have been made by owners of Connecticut franchises to nonresidents and such procedure is absolutely certain to take place in the detail of such business transactions.

The restriction, which requires the oyster franchises of Connecticut to be held only by residents of this State, or corporations organized in this State, is continually being violated, and will require further validating acts to legalize. In addition, if it could be enforced, it would limit the business operations and developments of the oyster properties, would hamper the growth of the industry both offshore and on shore, and keep down the amount of property which would be rightly taxable in the State.

This Board has recommended that the natural oyster grounds be leased only to Connecticut citizens, which seems very desirable, but the Board sees no reason for continuing the statute which requires the oyster franchises to be held by residents of this State. The Board, therefore, definitely recommends that that part of Section 3215 of the general statutes which makes this requirement be amended, so that the transfer of oyster franchises by the owners thereof be not restricted.

FEDERAL BUREAU OF FISHERIES.

The Bureau of Fisheries of Washington, under the direction of the Department of Commerce and Labor, has been collating statistics of the oyster industry in New England for the fiscal year 1910. The work in Connecticut was commenced the latter part of September. At the request of the Board, the Commissioner of Fisheries, Mr. George M. Bowers, assigned an additional man to hasten the work of securing the statistics in Connecticut so that the figures might be available for this report.

It will be noticed that the totals secured by the statisticians under the direction of the Bureau of Fisheries, relative to the number of bushels of oysters taken from the private beds, very largely exceed those submitted to the Board in the different individual reports of the Connecticut oyster growers.

The information thus given is very important, and the thanks of the Board and of the State are due the Bureau of Fisheries for its coöperation and courtesy in furnishing the information relative to the Connecticut oyster industry.

The data submitted are as follows:

DEPARTMENT OF COMMERCE AND LABOR, BUREAU OF FISHERIES.

STATISTICS OF THE OYSTER INDUSTRY OF CONNECTICUT FOR THE YEAR
ENDING JUNE 30, 1910.

Persons employed :	Number.	Value.
On vessels fishing.....	657	.....
On vessels transporting.....	22	.....
In shore or boat fisheries.....	535	.....
Shoresmen.....	1,489	.....
Total.....	2,703	.....
Vessels, boats, apparatus, etc.		
Vessels fishing.....	161	\$596,115
Net tonnage.....	3,863	.....
Vessels transporting.....	8	53,700
Net tonnage.....	412	.....
Boats.....	554	43,632
Apparatus—vessel fisheries :		
Dredges.....	638	10,133
Mops.....	77	1,475
Apparatus—shore fisheries :		
Dredges.....	191	966
Tongs, rakes, etc.....	468	2,639
Mops.....	2	10
Shore property.....		403,160
Total.....		\$1,183,719
Private oyster grounds owned :		
State grounds.....acres	74,151.85	\$1,759,968
Town grounds....."	5,027.00	109,734
Private oyster grounds under culture :		
State grounds.....acres	25,292.65	.....
Town grounds....."	1,978.60	.....
Planted during the year....."	5,955.05	.....
Materials planted during the year :		
Seed oysters.....bushels	219,923	\$107,889
Oyster shells....."	3,186,001	234,895
Gravel, etc.....cubic yards	215,490	2,656
Total.....		\$345,450
Products from private areas :		
Market oysters.....bushels	1,324,225	\$801,790
Seed oysters....."	1,754,472	975,266
Products from public areas :		
Market oysters.....bushels	25,790	24,270
Seed oysters....."	167,513	84,168
Oyster shells....."	112,300	7,265
Total.....	3,384,300	\$1,892,759
Oysters on private areas at the end of the year		
bushels	3,784,175	\$1,856,285
Products of the wholesale trade :		
Market oysters sold in the shell.....bushels	512,379	\$ 382,437
Oysters sold opened.....gallons	1,082,960	1,168,761
Seed oysters sold or transferred to		
other states.....bushels	932,958	511,139
Oyster shells sold....."	470,050	26,282
Total.....		\$2,088,619

NOTE.—The above value for private oyster grounds is the assessed value.
The value of oysters on the beds at the end of the year includes that of stakes,
buoys and marks.
A large proportion of the oysters opened are from other states.

COMPARATIVE FINANCIAL TABLES.

RECEIPTS AND EXPENSES AS SHOWN IN SHELL-FISH COM-
MISSIONERS' REPORT FOR 1910.

1908-1909.

Receipts.

Taxes collected	\$11,892.62
Natural bed licenses.....	1,002.00
Total	<hr/> \$12,894.62

Certain Expenses.

Buoying natural beds	\$1,116.70
Oyster police.....	2,753.00
Inspecting natural beds.....	600.00
Mud dumping	740.00
Total	<hr/> \$5,209.70
Available balance.....	<hr/> \$7,684.92

1909-1910.

Receipts.

Taxes collected	\$26,141.58
Natural bed licenses.....	650.00
Total	<hr/> \$26,791.58

Certain Expenses.

Buoying natural beds.....	\$1,237.30
Oyster police.....	2,806.00
Inspecting natural beds.....	600.00
Mud dumping	601.70
Total	<hr/> \$5,245.00
Available balance.....	<hr/> \$21,546.58

ESTIMATED RECEIPTS UNDER NEW SYSTEM OF TAXATION BASED ON REPORTS TO THE BOARD OF EQUALIZATION.

Tax of 2 cents a bushel.

Annual franchise tax,		
70,000 acres @ 15c. per acre.....	\$10,500	\$10,500
Productivity tax from private ground,		
1,500,000 bu. @ 2c. per bu.	30,000	45,000
Natural beds lease return,		
4,500 acres @ \$1 per acre	4,500	4,500
Productivity tax from natural ground,		
200,000 bu. @ 2c. per bu.	4,000	6,000
Total	\$49,000	\$66,000

Tax of 3 cents a bushel.

Annual franchise tax,		
70,000 acres @ 15c. per acre.....		\$10,500
Productivity tax from private ground,		
1,500,000 bu. @ 3c. per bu.		45,000
Natural beds lease return,		
4,500 acres @ \$1 per acre		4,500
Productivity tax from natural ground,		
200,000 bu. @ 3c. per bu.		6,000
Total		\$66,000

ESTIMATED RECEIPTS UNDER NEW SYSTEM OF TAXATION BASED ON STATISTICS FURNISHED BY THE BUREAU OF FISHERIES.

Tax of 2 cents a bushel.

Annual franchise tax,		
70,000 acres @ 15c. per acre.....	\$10,500	\$10,500
Productivity tax from private ground,		
3,000,000 bu. @ 2c. per bu.	60,000	90,000
Natural beds lease return,		
4,500 acres @ \$1 per acre	4,500	4,500
Productivity tax from natural ground,		
200,000 bu. @ 2c. per bu.	4,000	6,000
Total	\$79,000	\$111,000

Tax of 3 cents a bushel.

Annual franchise tax,		
70,000 acres @ 15c. per acre.....		\$10,500
Productivity tax from private ground,		
3,000,000 bu. @ 3c. per bu.		90,000
Natural beds lease return,		
4,500 acres @ \$1 per acre		4,500
Productivity tax from natural ground,		
200,000 bu. @ 3c. per bu.		6,000
Total		\$111,000

SHELL-FISH COMMISSION.

So long as the present system of taxation is continued, which requires the clerk of the Shell-Fish Commission to act as an assessor and the members of the Commission as a board of relief, it is undoubtedly desirable that it consist of three members. Investigations of the Board have demonstrated the very great advantage of a practical knowledge of the oyster business in considering any subjects relative thereto. This advantage would apply as well to the Shell-Fish Commission as to the Board. Considering, therefore, the many matters which must be considered by the Shell-Fish Commissioners, which require a technical knowledge of the oyster industry, it seems to the Board very desirable that one of the three members be a practical oysterman, as is required in several states. Such a person should have had at least ten years' experience in growing oysters in this State. Such a recommendation is hereby definitely made.

If, however, the method of taxation should be changed to that recommended by the Board, a commission of three members would be no longer necessary. In that event, the Board recommends that the law be changed to provide for a single-headed commission and that all references relative to disputed boundaries be submitted to the superior court for adjudication. Such action would enable an increased salary to be paid to the Commissioner, as an executive officer, would permit greater demands on his time for the work required, would focus responsibility, and probably would result in more definite supervision.

MAPS.

The maps that accompany this report ought to be self-explanatory. Briefly, however, the purpose of the first is to show the location of all oyster franchise ground under the State's jurisdiction outside the town lines occupied under private ownership at the present time, also the location of the natural beds. On the same map there is shown in colors the approximate location of the hard ground, also the so-called soft or muddy ground.

The maps in the folder, the tracings of which are used by the courtesy of the Shell-Fish Commission, show the per acre assessed valuation of the different lots, varying from five dollars

to one hundred fifty dollars per acre. The purpose of this is to show the assessed valuations of the different contiguous lots, and to give an opportunity for criticism and for suggestions, so that inequalities may be overcome in the future, if the present system of taxation is to be continued.

ACKNOWLEDGMENTS.

The Board wishes to express its appreciation of the courteous and helpful attitude of the different members of the Shell-Fish Commission.

The Chairman, Mr. George C. Waldo, who has filled that position continuously since 1893, and who has been a member of the Commission since 1889, has been of particular assistance in giving the Board the benefit of his long experience in, and definite knowledge of, the oyster industry.

The Board is under great obligations to Mr. Frederick L. Perry, the clerk of the Shell-Fish Commission, for his accurate legal knowledge of the many technical features connected with the Connecticut system of granting and taxing oyster franchises; for his fair and unprejudiced attitude towards all questions involved; for his manifest desire to enable the Board to secure all the necessary information on any phase of the oyster industry, and finally for the time given in attending many meetings with the Board and its separate members, all of which, with the valuable counsel mentioned above, has been given without any charge whatever for his services.

Captain William A. Lewis, the Inspector of natural beds, has rendered the Board definite services in giving it important information relative to the nature and use of the natural beds.

It would have been almost impossible for the Board to have acquired sufficient knowledge of the many details of the oyster industry in so short a time without such aid as was given by Captain E. Frank Lockwood. The Board received the benefit of his wide experience, his practical knowledge of relative values, and his complete familiarity with every detail of the business.

All the members of the State Board of Health, and particularly its president, Dr. Edward K. Root, and its secretary, Dr. Joseph H. Townsend, have been very willing to coöperate with the Board in securing information relative to polluted grounds.

Mr. James A. Newlands, the chemist, has been of particular assistance in working out the data which are included in the very enlightening and satisfactory report of the condition of New Haven Harbor given elsewhere. This work was undertaken by vote of the State Board of Health without any specific appropriation for the same, and the results attained show conclusively the value of such an investigation. The finding is a very important part of this report and the coöperation which brought it about has been particularly appreciated by the Board of Equalization.

A large number of the oyster growers have been very helpful in furnishing specific information relative to the many details and methods employed in the conduct of their business. The completion of this report in its practical suggestions would have been impossible without such assistance.

SUMMARY OF RECOMMENDATIONS.

The different recommendations have been fully discussed and the reasons given therefor in other parts of the report. For convenience, however, they are herewith summarized and reference given to the page of the report containing the general discussion.

It is recommended:

1. That the law which provides for the granting of grounds under the perpetual franchise system be amended to provide for the leasing of such ground under State jurisdiction, which is not already allotted to private owners, together with all land which shall revert to the State from those holding the same under franchises. (Page 30.)

2. That the law providing for the policing of the oyster ground by the State be repealed, and a statute enacted which will provide a liberal bounty for the detection and conviction of any one stealing oysters or committing other offences against the shell-fish laws. (Page 31.)

3. That the statute relative to mud or refuse dumping be amended so that the expenses of the inspectors shall be paid by the contractors. (Page 32.)

4. That the law requiring buoys to be set at the expense of the State be repealed. (Page 33.)

5. That the law taxing the oyster franchises be amended to provide for a minimum valuation of ten dollars per acre on all ground held under such franchises at the present tax rate of fifteen mills, and in addition a productivity tax of two or three cents per bushel upon all seed or other oysters taken from such grounds in this State for sale, or for the purpose of removal out of the State. The act also should provide for confidential reports by the producers and a proper system of state inspection of the same, all to be under the direction and supervision of the Shell-Fish Commissioners, also that the provisions of the law providing for present assessor and board of relief be repealed. (Page 42.)

6. That the natural beds, as described in the general statutes, be abolished and such territory leased to citizens of the State for a definite term of years subject to renewal, at an annual rental of one dollar per acre in addition to a productivity tax of two or three cents per bushel. (Page 49.)

7. That laws be enacted which will prevent contamination through new sources by sewage and other disease-breeding wastes of harbors, rivers and coastal waters of the State, and further provisions be enacted which will require within a reasonable number of years the entire removal of such harmful substances from the waters of the State. (Page 58.)

8. That the State Board of Health be authorized and required to make a sanitary investigation of the harbor and coastal waters of the State where oysters are grown, and to give certificates attesting the purity of all grounds which are proper for maturing market oysters and to withhold certificates from all other oyster grounds, and to forbid the sale in any towns in this State of oysters taken from beds which are not certified to be satisfactory. (Page 60.)

9. That the State Board of Health by its agents be authorized and required to inspect, at varying intervals, the opening houses in the State, employing the score card system similar to that used in Rhode Island, and to secure proper sanitary surroundings and conditions in all such houses and in any processes connected with the work of opening and shipping oysters. (Page 62.)

10. That an appropriation of eight hundred dollars per annum be made for the conduct of a scientific investigation of

oyster growing in Connecticut waters by the Marine Laboratory of the Sheffield Scientific School. (Page 69.)

11. That Section 2215 of the General Statutes be amended to permit the transfer of perpetual franchises of oyster grounds to any nonresident person or persons, or to any nonresident joint stock company or corporation. (Page 75.)

12. That one member of the Shell-Fish Commission shall be a practical oysterman who has had at least ten years' experience in the growing of oysters in this State. (Page 80.)

RECAPITULATION.

The oyster business has grown from a small beginning to one of large magnitude. This has been brought about by the persistent energy of the oyster growers, who by artificial development have made the most of certain natural opportunities. Those engaged in the industry are fine types of successful men, reasonable, businesslike, and fair, and yet always working for the advancement of their vocation.

The oyster industry in the long run is as satisfactory as, and not much more hazardous than, that of raising tobacco, or conducting a manufacturing plant with the uncertainties of tariff and other legislation.

The government regulations requiring certain sanitary precautions in interstate shipments cannot be considered other than reasonable, and for the protection of the consumer. It is certain also that their rigid enforcement will increase the public confidence in the product. And once it is realized that oysters grown under sanitary surroundings can be delivered to any part of the United States in proper condition for use, the demand for this cheap and palatable food will increase to such an extent that it will be necessary to very largely develop its productive capacity to provide a sufficient supply.

While at the public hearings which the Board held last spring the oyster growers complained that the publicity given by the Department of Agriculture to certain alleged dangers in the use of oysters as a food would arouse suspicion and would seriously interfere with a successful business, the actual facts during the fall season are that the demand for oysters has been even greater than in previous years. This actually shows the

good results of such publicity by the increased confidence which the sanitary requirements of the federal government have given to the consumers of this food product.

Practically all the recommendations, which the Board is making, have been discussed in detail with different oyster growers. They have at various times, in conversation with the different members of the Board, admitted that the suggested changes would be desirable. They have even conceded that the present system of taxation is almost impossible to carry out with any degree of equality, and that the proposed plan of a minimum franchise tax, with a production tax in addition, would be fairer, in requiring only a reasonable tax whenever a poor condition of the business exists and increased return to the State whenever conditions are more productive. A large number of the oyster growers have definitely expressed themselves as being perfectly willing to pay a reasonable tax, if the State would do its part in taking steps to remove the contamination of the harbors and coastal waters, and would provide reasonable means for an investigation of the best methods of oyster growing similar to those carried on by other states and similar to those conducted for other industries in this State.

The duty of investigating the oyster properties and business was imposed upon the Board unsought. The General Assembly of 1909 apparently wished that specific information relative to the subject be secured and presented to the General Assembly of 1911. In formulating the report the Board has had in mind the fact that very few people have any clear idea of the nature or development of the oyster industry. The purpose has been, therefore, to provide sufficient information so that the Committee on Shell-Fisheries and other interested members of the General Assembly will be able to secure a fair and definite knowledge of the entire subject.


As stated previously, the Board has discussed the recommendations, which it is making, with the oyster planters sufficiently to know that they are reasonable, desirable and practical. If enacted into laws they will be for the real good of the oyster industry, will bring about economies, and will insure an increased revenue to the State. Any active opposition to their enactment by the oyster growers would appear to be shortsighted.

The Board does not feel in any way responsible for the enactment into laws of its recommendations. The members of the Board, individually, will be very willing to answer any questions relative to the details of the report, to confer with the members of the Committee on Shell-Fisheries, or to give any supplemental information that the General Assembly may desire, and that it is possible to secure. They will not, however, attempt to lobby any measures through the legislature, nor try to persuade any of the members to favor any particular recommendation, for the Board considers that it has done its duty in presenting its findings to the General Assembly, as required, and that its responsibility ceases therewith.

Respectfully submitted,

A cursive handwritten signature that reads "Freeman F. Patton". The signature is written in dark ink and has a long, sweeping tail that curves under the name.

Treasurer,

A cursive handwritten signature that reads "Thomas E. Rudstreet". The signature is written in dark ink and has a long, sweeping tail that curves under the name.

Comptroller,

A cursive handwritten signature that reads "W. H. Corbin". The signature is written in dark ink and has a long, sweeping tail that curves under the name.

Tax Commissioner,

THE BOARD OF EQUALIZATION.

VARIOUS LAWS
REGULATIONS AND BLANK FORMS
RELATIVE TO THE
OYSTER INDUSTRY

FROM THE OYSTER LAW OF THE STATE OF LOUISIANA.

Section 9. Be it further enacted, etc., That from and after the passage of this Act the rentals on all leased water bottoms and natural reefs made in conformity with the provisions of this Act, shall not be less than one dollar (1.00) per acre or any fraction of an acre per year on all soft and hard bottoms and depleted reefs and not less than five dollars (\$5.00) per acre or any fraction of an acre per year for all natural reefs, said amount to be determined by the Board after the Chief Surveyor has reported on same as provided herein. The rate named by the Board for such leases shall be conclusive and final.

Sec. 11. Be it further enacted, etc., That each packer, canner, commission man, dealer, firm, or corporation, shall keep a record of all oysters purchased by himself or themselves, with the names of the parties from whom purchased, the quantity, and the date. They shall also keep an itemized account of all oysters fished by themselves and by all boats controlled by them and shall exhibit said account at all times to the Board of Commissioners for the Protection of Birds, Game and Fish, or any of its authorized employees. On the first day of each month said packer, canner, commission man, dealer, firm, or corporation, shall make a return under oath, to said Board as to the number of barrels purchased and caught during the preceding month, and a tax of three (3) cents per barrel on each and every barrel of oysters canned, packed or gathered from the leased water bottoms and reefs, either for sale or consumption, shall be levied thereon by said Board.

Inspectors of said Board are authorized to enter upon any boat, or to enter any building other than a domicile, where oysters are carried or stored and to inspect such oysters at all times.

In all operations of the Board, the standard measurement of the barrel referred to herein shall be three and seventy-three one-hundredths (3.73) cubic feet, which approximately represents the cubic contents of three (3) bushels, or one barrel.

(It is authoritatively stated that a barrel of Connecticut oysters in the shell will open up about three times more meats than a barrel of Louisiana oysters.)

STATE OF RHODE ISLAND.

AN ACT IN AMENDMENT OF AND IN ADDITION TO CHAPTER 206 OF THE GENERAL LAWS, ENTITLED "OF THE PROTECTION OF THE SHELL-FISHERIES IN THE PUBLIC WATERS OF THIS STATE."

It is enacted by the General Assembly as follows:

Section 1. Chapter 206 of the General Laws, entitled "Of the protection of the shell-fisheries in the public waters of this state," is hereby amended to read as follows:

Section 1. No person shall deposit in, or allow to escape into, or shall cause or permit to be deposited in, or allowed to escape into, any of the public waters of this state, any substance which shall in any manner injuriously affect the growth or sale of the shell-fish in or under said waters, or which shall in any manner affect the flavor or odor of such shell-fish so as to injuriously affect the sale thereof, or which shall cause any injury to the public and private fisheries of this state.

Sec. 2. Any person violating any of the provisions of this act shall upon conviction thereof be fined not less than five hundred dollars or more than two thousand dollars, one-half thereof to the use of the complainant and one-half thereof to the use of the state: *Provided*, that in case of conviction upon prosecution by the commissioners of shell-fisheries, the whole or any fine imposed shall go to the use of the state.

Sec. 3. Every person violating any of the provisions of this act shall be liable to pay to the party injured by such violation double the amount of damages caused thereby, to be recovered in an action of the case in any court of competent jurisdiction. It shall not be necessary, before bringing suit for recovery of such damages, for a criminal prosecution to have been first instituted for the violation of the provisions of this chapter, nor shall the recovery of damages under this section be a bar to such criminal prosecution.

Sec. 4. It shall be the duty of the commissioners of shell-fisheries to investigate all complaints made to them of the violation of any of the provisions of this act. For the purpose of such investigation said commissioners may make examination of the premises, hold public hearings, summon witnesses, and take testimony under oath, and they shall have power to punish, by fine or imprisonment or both, all contempt of their authority in any hearing before them. They may employ professional or expert services, as they may deem desirable.

Sec. 5. It shall be the duty of the shell-fish commissioners to prosecute any person in their opinion guilty of the violation of any of the provisions of this chapter, and in all such prosecutions said commissioners shall not be required to enter into any recognizance or to give surety for costs. It shall be the duty of the attorney-general to conduct the prosecution of all cases brought by said commissioners under the provisions of this chapter. Complaints may be also brought and prosecuted by any citizen for any violation of its provisions.

Sec. 6. The expenses incurred by the commissioners of shell-fisheries in the performance of the duties imposed upon them by this chapter shall be paid by the general treasurer, out of any funds in the treasury not otherwise appropriated, upon the presentation of vouchers, therefor duly certified by their chairman.

Sec. 7. The commissioners of shell-fisheries shall inspect the premises designated in section 8 of this chapter at such times as they may deem advisable, for the purpose of determining whether said premises are kept in a proper sanitary condition for opening, handling, or packing shell-fish for the trade. Also said commissioners shall inspect the methods followed on the premises in opening, packing, or preparing shell-fish for the trade, to determine whether such methods are proper from a sanitary standpoint.

Sec. 8. The premises which come within the scope of this chapter are all establishments where oysters or other shell-fish are opened, packed, or prepared for the trade. Retail or wholesale markets where shell-fish are sold which purchased from the original opening or packing houses designated in this section shall not come within the scope of this chapter.

Sec. 9. Said commissioners shall inspect any or all the leased oyster grounds and other shell-fish grounds within the state at such times as they may deem advisable, to determine whether said grounds are in a proper sanitary condition for the production of shell-fish for consumption as food.

Sec. 10. Said commissioners may make such regulations in regard to sanitation as they may deem advisable, from time to time, with reference to the sanitary handling of shell-fish and with reference to maintaining opening or packing houses in a proper sanitary condition.

Sec. 11. Said commissioners may issue certificates from time to time to any person whose premises or grounds are found by them to be in a sanitary condition, setting forth that they have examined such opening or packing house or such shell-fish ground and that the methods followed in the preparation of oysters or other shell-fish in such opening or packing house are sanitary and that the grounds inspected are in proper sanitary condition for the production of shell-fish for consumption as food.

Sec. 12. No person shall take shell-fish from any grounds which are not certified by said commissioners as being in a sanitary condition, except for the purpose of transplantation. No person shall prepare shell-fish for the trade except on premises and by methods certified by said commissioners as being sanitary.

Sec. 13. Any person who shall violate any sanitary regulation made by said commissioners, as provided for in section 10, shall be fined \$20 for the first offence, and for each subsequent offence \$100 and be imprisoned not more than ninety days in jail. Any person violating the provisions of section 12 of this chapter shall be fined \$20 for the first offence, and for each subsequent offence \$100 and be imprisoned not more than ninety days in jail.

Sec. 14. It shall be the duty of the commissioners of shell-fisheries to prosecute any person in their opinion guilty of the

DETAILED SCORE.

EQUIPMENT.	SCORE.		METHODS.	SCORE.	
	Perfect.	Allowed.		Perfect.	Allowed.
COWS.					
Health	6	-----	Cleanliness of cows	8	-----
Apparently in good health 1					
If tested with tuberculin once a year and no tuberculosis is found, or if tested once in six months and all reacting animals removed 5					
(If tested only once a year and reacting animals found and removed, 2.)					
Comfort	2	-----			
Bedding	1	-----	STABLES.		
Temperature of stable	1	-----	Cleanliness of stables	6	-----
Food (clean and wholesome)	2	-----	Floor	2	-----
Water	2	-----	Walls	1	-----
Clean and fresh	1	-----	Ceiling and ledges	1	-----
Convenient and abundant	1	-----	Mangers and partitions	1	-----
			Windows	1	-----
STABLES			Stable air at milking time	6	-----
Location of stable	2	-----	Barnyard clean and well drained	2	-----
Well drained	1	-----	Removal of manure daily to field or proper pit	2	-----
Free from contaminating surroundings	1	-----	(To 50 feet from stable, 1.)		
Construction of stable	4	-----	MILK ROOM.		
Tight, sound floor and proper gutter	2	-----	Cleanliness of milk room	3	-----
Smooth, tight walls and ceiling	1	-----			
Proper stall, tie, and manger	1	-----	UTENSILS AND MILKING.		
Light: Four sq. ft. of glass per cow	4	-----	Care and cleanliness of utensils	8	-----
(Three sq. ft., 3; 2 sq. ft., 2; 1 sq. ft., 1. Deduct for uneven distribution.)			Thoroughly washed and sterilized in live steam for 30 minutes	5	-----
Ventilation: Automatic system	3	-----	(Thoroughly washed and placed over steam jet, 4; thoroughly washed and scalded with boiling water, 3; thoroughly washed, not scalded, 2.)		
Adjustable windows	1	-----	Inverted in pure air	3	-----
Cubic feet of space for cow: 500 to 1,000 feet	3	-----	Cleanliness of milking	9	-----
(Less than 500 feet, 2; less than 400 feet, 1; less than 300 feet, 0; over 1,000 feet, 0.)			Clean, dry hands	3	-----
UTENSILS.			Udders washed and dried ... 6		
Construction and condition of utensils	1	-----	(Udders cleaned with moist cloth, 4; cleaned with dry cloth at least 15 minutes before milking, 1.)		
Water for cleaning	1	-----	HANDLING THE MILK.		
(Clean, convenient, and abundant.)			Cleanliness of attendants	1	-----
Small-top milking pail	3	-----	Milk removed immediately from stable	2	-----
Facilities for hot water or steam	1	-----	Prompt cooling (cooled immediately after milking each cow)	2	-----
(Should be in milk house, not in kitchen.)			Efficient cooling; below 50° F.	5	-----
Milk cooler	1	-----	(51° to 55°, 4; 56° to 60°, 2.)		
Clean milking suits	1	-----	Storage; below 50° F.	3	-----
			(51° to 55°, 2; 56° to 60°, 1.)		
MILK ROOM.			Transportation; iced in summer	3	-----
Location of milk room	2	-----	(For jacket or wet blanket, allow 2; dry blanket or covered wagon, 1.)		
Free from contaminating surroundings	1	-----			
Convenient	1	-----			
Construction of milk room	2	-----			
Floor, walls, and ceiling	1	-----			
Light, ventilation, screens	1	-----			
Total	40	-----	Total	60	-----

Equipment..... + Methods..... = Final Score.

NOTE 1.—If any filthy condition is found, particularly dirty utensils, the total score shall be limited to 49.

NOTE 2.—If the water is exposed to dangerous contamination or there is evidence of the presence of a dangerous disease in animals or attendants, the score shall be 0.

RHODE ISLAND COMMISSIONERS OF SHELL-FISHERIES.

INSPECTION OF OYSTER HOUSES.

Owner's Name
 Opening House at
 Date of Inspection
 Inspector
 Method of transportation from beds to opening house

 Are floats used for holding stock
 Number Condition
 Location of floats
 Opening House.
 Light Ventilation
 Ceiling and walls
 Floor, material Condition
 Bins.
 Method of operating
 Construction Properly emptied
 Facilities for cleaning
 Condition
 Utensils.
 Quality Condition
 Properly washed How often
 Sterilized How often
 Water.
 Source Quality
 Tank Construction Clean
 How frequently cleaned
 Hot Water.
 Method of heating Abundant
 Steam.
 Source Sterilizer
 Ice.
 Source Quality
 Refrigerator Condition
 How frequently cleaned
 Employees.
 Character of employees
 Cases of illness among employees
 Cases of illness in families of employees
 Methods of Handling.
 Use of gloves Aprons
 Condition of clothing
 Method of washing oysters
 Length of time required
 Method of cooling oysters
 Length of time required

Method of storing oysters	
Length of time required	
Kind of shipping cans	
Condition	Properly washed
Sterilized	
Toilet Facilities.	
Properly located	Clean
Method of sewage disposal	
Facilities for washing hands	
Hot and cold water	Towels
Instruction of employees as to cleanliness by signs or otherwise	
Remarks.	

PRELIMINARY SUGGESTIONS TO OWNERS OF OYSTER HOUSES.

*Office of the Commissioners of Shell-Fisheries of the State of
Rhode Island.*

LOCATION OF OYSTER BEDS. For the protection of the consumer it is necessary that the sale of oysters from beds which are subject to sewage contamination be prohibited. It is without doubt true that oysters thrive and grow rapidly in water containing sewage. But because of the danger of the transmission of diseases by sewage-grown oysters, and because no one wishes to use as food oysters which have been exposed to sewage contamination, steps have been taken to prevent the sale of such oysters in interstate trade by the United States authorities, and in State trade by the Commissioners of Shell-Fisheries of Rhode Island.

Every endeavor is being made at present by both of these authorities to prevent sewage contamination of waters in which oysters are grown, and also to map out, as far as possible, the location of present sewage pollution in these waters. Within a short time it will be possible to advise the lessees of oyster grounds whether or not their beds are free from pollution. At the present time about all the information that can be given is that oyster beds situated north of Conimicut and Nayatt Points are not fit ground from which to market oysters, and the sale of any oysters from these beds will be prohibited. The same applies to oysters grown in Warren River above a line drawn from the southern end of Rumstick Point to the Warren and Bristol town line. These restrictions may be removed as soon as some of the present sources of pollution are stopped.

FLOATING OYSTERS. Oysters may be polluted, after they are removed from the growing beds, by being held in unclean water. Holding oysters in floats in such a way that they come in contact with water which is contaminated with sewage will not be allowed.

If such water is clean, and this can only be determined by analysis, which will be made by the Commission on request, and if it is practically as salt as the water in which the oysters are grown, no harm can come from this practice.

CONSTRUCTION OF THE OPENING HOUSES. Opening houses should be well lighted and well ventilated. Dark, damp houses are injurious to the health of those employed therein and are conducive to dirt, dampness, and decay. Light and air are two of the very best disinfectants. Walls, bins, benches, and floor should be so constructed that they may be flushed with water and scrubbed clean. All accumulation of shells and fragments of oyster meat should be scrupulously avoided, as they decay rapidly. Cleaning should be done at least every day. The ceiling should be free from cobwebs and dust. A good brushing-down once each season, and the application of a coat of whitewash or cold-water paint, will add much to the cleanliness and light of the place. Dust from above is much more apt to drop into opened oysters than that on the floor. Screens at the windows and doors will prevent flies from bringing contamination to the opened oysters.

BINS. If bins are used for holding the oysters before they are opened, they should be so constructed that all of the oysters are delivered to the openers. No beams or corners should be left where the oysters collect. One or two old oysters from previous fillings of the bins may contaminate a whole new lot of oysters. The bins should be washed out thoroughly from accumulations of dirt and shells between each filling. It is much better to empty a bin of one lot of oysters before a new lot is added, thus preventing the holding over of some oysters from one time to another.

BENCHES. The opening-benches should be kept clean. Frequent flushing and scrubbing will be necessary, preferably with boiling water, at the places where the openers stand. Pieces of oyster meat remaining on the benches, and oyster liquor which has soaked into the wood, decay and contaminate new oysters which may come in contact with them. Openers should not be allowed to open oysters directly upon the benches, but always into proper containers.

UTENSILS. All pans, measures, colanders, buckets, cans, etc., used for holding opened oysters should be of such construction and material that they may be properly cleaned. The simpler the construction, the less corners, seams and rust, the more easily this may be done. They should be thoroughly washed with soap and hot water, and then scalded out with boiling water or steam, at least once every day. Water that is actually boiling will destroy accumulations of germs. Steaming in streaming steam or steam under pressure is even more effective. A steam chest or sterilizer into which all utensils may be placed after washing and left in

the steam for ten or fifteen minutes is the surest method of sterilization. The same care must be employed with utensils that come in contact with opened oysters that the dairyman takes with his milk-cans to prevent the souring of the milk. Knives used by the openers must be subjected to the same treatment.

WATER SUPPLY. An abundant supply of pure water is necessary in an oyster house. This must be available not only for washing the oysters, but also for flushing the bins, benches, and floor, and for washing the utensils. As much care must be exercised in the selection of a source of supply as is used where the water is to be used for drinking purposes. If a well is the source of supply it must be properly located so that it is free from all possibility of sewage contamination.

If a town supply is used it also must be perfectly free from suspicion. It is the intention of this Commission to make analyses of the water supplies of the various oyster houses of the State, and to furnish information to those interested as to the quality of the water.

If a tank is used for storing the water it should be properly covered to prevent dirt, dust, and animals from finding their way into it. About once every month it should be drained dry and scrubbed out, to free it from any accumulation of sediment.

HOT WATER. An abundant supply of hot water is absolutely necessary in every oyster house. This will be insisted upon by this Commission before licenses are granted. The hot water must be available both for washing the utensils and benches, and also for washing the hands of the employees. A sufficient supply cannot be obtained by heating in a vessel on a stove. It will be necessary to install a hot-water supply in connection with the heating plant or steam supply.

STEAM. Some arrangement must be provided so that steam may be had abundantly for scalding out the utensils and, if possible, for a steam chest or sterilizer. Every shop needs some heating apparatus, and the simplest method would be to combine heating, steam, and hot-water supply from the same boiler.

ICE. The source of the ice supply must be considered from the sanitary standpoint also. Ice may contain contaminating germs. If contaminated ice comes in contact with the oysters during the cooling process there is danger of the oysters becoming contaminated. The Commission will also undertake to determine the quality of the ice supply of the various houses.

The less time oysters are in contact with ice or iced water, the better. Cooling must be effected as rapidly as possible. The smaller the bulk of oysters exposed to the water or ice at one time, the more rapid and efficient the cooling. If oysters are rapidly and thoroughly cooled as soon as opened, and then kept at a fairly low temperature, there should be practically no increase in the number of germs of any sort present.

The ice box or refrigerating room in which opened oysters are held should be cleaned and scrubbed at frequent intervals, so that it may be clean, sweet, and free from odors.

EMPLOYEES. Too much stress cannot be laid upon the necessity of having the hands and clothing of the employees clean. If the oyster beds are free from pollution and the utensils properly sterilized, practically the only other important source of contamination is the handling of the oysters by the openers. Every facility must be provided for them to wash their hands every time they come to the opening-benches to begin work. If they leave the bench for any reason except to deposit the opened oysters at the proper place, they should again wash their hands. They should be particularly instructed to wash their hands thoroughly after the use of the closet. An abundant supply of hot and cold water, soap, and clean towels should be conveniently located, and constant verbal directions by those in charge, or printed signs, should call attention to this important point. A little attention to this matter would soon make clean hands a habit with them. They must also be instructed to wear aprons, gloves, and finger cots which are clean. It would be well for the owners of the shops to furnish these, so that their condition as to cleanliness can be properly controlled. The same process of boiling or sterilization used for the utensils should be followed with these articles also. Jumpers and overalls or other outer clothing worn by the employees should be reasonably clean.

Inquiry should be made for cases of illness among the employees or their families at frequent intervals. No man should be allowed in the opening-house, or to have anything to do with the handling of the oysters who has recently had any contagious disease, or in whose family there has been such a case. The advice of the local health officers or of this Commission may be had in this matter.

TOILET FACILITIES. Toilet facilities must be provided, but they must be so located that there is no danger of pollution from this source. A properly located and constructed closet on land is much better than an open closet on the wharf. In either case the closet must be kept clean and flies excluded from the pit. In large houses, where many men are employed, some proper method of sewage disposal must be installed. The Commission will always be ready to advise as to what method they think best adapted to any particular case.

The Commission feels that the above instructions and directions are not at all unreasonable, and that they may be carried out without imposing any greater expense than is absolutely necessary to insure a clean product. This added expense will be more than made up by the increased market value of the product and the increased consumption when the public knows that the oysters are produced under sanitary regulations.

The inspector of the Commission will visit the opening-houses from time to time to see whether the above directions are carried out; and unless the shops conform substantially to the above regulations, licenses will not be issued and those that are issued will be cancelled.

(A large printed card containing the main points of the above is required to be placed on the wall of every Rhode Island opening house for the attention of the employees.)

BOARD OF HEALTH, CITY OF NEW HAVEN.

HEALTH REGULATIONS DE OYSTERS.

Section 1. The floating or fattening of oysters in the polluted waters of New Haven harbor or in any rivers or streams opening into said harbor, and the selling or offering for sale of oysters contaminated by such waters, is hereby prohibited.

Sec. 2. Every person violating this regulation, on conviction, shall forfeit or pay a penalty of not more than one hundred dollars.

STATE OF MASSACHUSETTS.

(Chap. 460)

AN ACT RELATIVE TO THE DISCHARGE OF WASTE MATERIALS INTO THE STREAMS OF THE COMMONWEALTH.

Be it enacted, etc., as follows:

Section 1. If the commissioners on fisheries and game determine that the fisheries of any brook or stream in this commonwealth may be of sufficient value to warrant the prohibition or regulation of the discharge or escape of sawdust, shavings, garbage, ashes, acids, sewage, dye stuffs, and other waste material from any particular sawmill, manufacturing or mechanical plant, or dwelling house, stable or other building, which may, directly or indirectly, materially injure such fisheries, they may by an order in writing to the owner or tenant of such sawmill, manufacturing or mechanical plant, dwelling house, stable or other building, prohibit or regulate the discharge or escape of sawdust, shavings, garbage, ashes, acids, sewage, dye stuffs, and other waste material therefrom into such brook or stream. Such order may be revoked or modified by them at any time. Before any such order is made said commissioners shall, after reasonable notice to all parties in interest, give a public hearing in the county where the sawmill, manufacturing or mechanical plant, dwelling house, stable or other building to be affected by the order is located, at which hearing any citizens shall have the right to be heard on the questions to be determined by the commissioners. Upon petition of the party aggrieved by such order, filed within six months after the date thereof, the superior court, sitting in equity, may, after such notice as it may deem sufficient, hear all interested

parties and annul, alter or affirm the order. If such petition is filed by the party aggrieved by said order within ten days after the date thereof, said order shall not take effect until altered or affirmed as aforesaid. Whoever, having so been notified, discharges sawdust, shavings, garbage, ashes, acids, sewage, dye stuffs, and other waste materials, or suffers or permits it to be discharged or to escape from said plant under his control, into a brook or stream in violation of the order of said commissioners, or of said court, if an appeal is taken, shall be punished by a fine of not more than twenty-five dollars for the first offence and of fifty dollars for a second offence.

Sec. 2. Section eight of chapter ninety-one of the Revised Laws, as amended by chapter three hundred and fifty-six of the acts of the year nineteen hundred and six, is hereby repealed.

Sec. 3. This act shall take effect on the first day of January in the year nineteen hundred and eleven.

Approved April 28, 1910.

Operative January 1, 1911.

STATE OF VIRGINIA.

DAIRY AND FOOD DIVISION.

WILLIAM D. SAUNDERS, *Commissioner*.

BENJAMIN L. PURCELL, *Deputy Commissioner*.

Richmond, Va., January 19, 1910.

RULES AND REGULATIONS.

Effective on and after this date, adopted by the Dairy and Food Commissioner and approved by the Commissioner and Board of Agriculture and Immigration, providing for the sanitation of canneries, packing houses, oyster-shucking plants, fish-packing plants, or store or market room or stall used in the packing, storage, sale or distribution of oysters, crabs, fish, lobsters, clams, etc.:

(1) Every building, room, shed, wharf or store used as a cannery, packing house, oyster-shucking plant, fish-packing plant or store or market, room or stall, selling or exposing for sale or for distribution or storage of oysters, crabs, fish, lobsters, clams, etc., shall be properly lighted, drained, plumbed and ventilated, and conducted with due regard for the purity and wholesomeness of the food therein produced, and with strict regard to the influence of such conditions upon the health of the operatives, employees, clerks, or other persons therein employed.

(2) The floors, side walls, ceilings, furniture, receptacles, implements, and machinery of every establishment where oysters, crabs, fish, lobsters, clams, etc., are packed, stored, sold, or distributed, shall at all times be kept in a clean, healthful, and sanitary condition.

(3) The above food in the process of preparation, packing, storing, sale, or distribution must be securely protected from flies, dust, dirt, and as far as may be necessary, from all other foreign or injurious contamination.

(4) All refuse, dirt, and the waste products subject to decomposition and fermentation incident to the preparation, packing, storing, selling and distributing of food must be removed from the premises daily.

(5) All trucks, trays, boxes, baskets, buckets, and other receptacles, chutes, platforms, racks, tables, shelves, and all knives, saws, cleavers and other utensils and machinery used in moving, handling, cutting, chopping, mixing, canning, and all other process, must be thoroughly cleaned daily by sterilization with either boiling water or live steam.

(6) The clothing of operatives, employees, clerks, or other persons must be as clean as practicable.

(7) The doors, windows and other openings of every cannery, oyster and fish-distributing establishment during the fly season shall be fitted with self-closing screen doors and wire window screens of not coarser than 14-mesh wire gauze.

(8) The sleeping place or places for persons employed in such establishments shall be separate and apart from the room in which food products are manufactured, packed, distributed, or stored.

(9) No employer shall knowingly permit, require, or suffer any person to work in a cannery, packing house, oyster-shucking plant, or store where oysters, crabs, fish, lobsters, clams, etc., are packed, shucked, stored, distributed, or kept for sale, who is afflicted with any contagious or infectious disease, or with any skin disease.

(10) Every cannery, packing house, oyster-shucking plant, etc., shall be provided with a convenient wash room and toilet of sanitary construction, but such toilet shall be entirely separate and apart from any room used for the manufacture or storage of food products.

(11) It is unlawful to take oysters or other shell-fish from insanitary or polluted beds to ship or to sell, or offer for sale, for human consumption.

(12) It is unlawful to ship or to sell or offer for sale oysters or other shell-fish which have become polluted because of packing under insanitary conditions, or being placed in unclean receptacles. In order to prevent pollution during the packing or shipment of oysters, it is necessary to give proper attention to the sanitary condition of the establishment in which they are packed and to use only receptacles which have been thoroughly sterilized.

(13) It is unlawful to ship or to sell or offer for sale oysters or other shell-fish which have been subjected to "floating"

or "drinking" in brackish water, or water containing less salt than that in which they are grown. There can be no objection to "drinking" shell-fish in unpolluted water. Attention is called, however, to the dangers resulting from "drinking" shell-fish near polluted fresh water streams and near other sources of pollution.

(14) It is unlawful to ship or sell, or to offer for sale shucked oysters to which water has been added, either directly or in the form of melted ice.

(15) The packing of shell-fish with ice in contact is inhibited.

(16) Only unpolluted cold or iced water should be employed in washing shucked shell-fish, and the washing, including chilling, should not continue longer than the minimum time necessary for cleaning and chilling.

(17) The shipment of oysters in contact with ice is inhibited. The floating of oysters in harbor waters or in polluted waters is inhibited.

(18) The taking of oysters for food purposes from polluted waters is inhibited.

(19) Suitable containers used for keeping, packing, or transporting oysters, fish, crabs, clams, etc., should contain on their surfaces in contact with the food product no lead, antimony, arsenic, zinc, or copper, or any compounds thereof, or any other poisonous or injurious substances.

If the containers are made of tin plates, they should be outside soldered and the tin plate in no place should contain less than 113 milligrams of tin on a piece five (5) centimeters square or one and eight-tenths (1.8) grains on a piece two (2) inches square. The inner coating should be free from blisters, pin holes, or cracks. If the tin plate is lacquered, the lacquer must completely cover the tin service within the container, and must yield to the contents of the container no lead, antimony, arsenic, zinc, or copper, or any compounds thereof, or any other poisonous or injurious substances.

It is recommended that retail dealers or distributors of oysters supply themselves with suitable smooth surface ware, free from inside seams and with oval bottoms and double tops, preferably granite or porcelain ware to be used as dispensing vessels. These vessels should be so arranged that they could be kept surrounded with ice or water for refrigeration purposes.

(20) In view of the fact that the shipping season has begun and shippers will require several months to provide themselves with suitable containers for the shipment of shell-fish out of contact with ice, no prosecutions will be recommended prior to May 1, 1910, for the shipment or sale of oysters or other shell-fish because of the addition of water caused solely by shipment in contact with ice.

No.....

APPLICATION
OF
.....
OF
.....
.....acres, in the Town of
.....
Filed the.....day of.....
19 ,o'clock,.....noon.

TO THE
SHELL FISH COMMISSIONERS
OF THE
STATE OF CONNECTICUT

The Application of a resident
of the Town of in the County of
and State of Connecticut respectfully shows: that he has resided
in said State more than one year next preceding the date of this
application; that the grounds hereinafter described are undesig-
nated grounds and are not now, and for ten years last past have
not been, natural clam or oyster beds; and have not been desig-
nated according to the provisions of the act hereinafter described
as natural oyster, clam or mussel beds; that he wishes and intends
to use said grounds for planting and cultivating shell fish. He
therefore respectfully requests that said Commissioners, pursuant
to an act entitled "An Act establishing a State Commission for
the Designation of Oyster Grounds," passed by the General
Assembly of Connecticut at its January Session, 1881, will grant to
him, in the name and behalf of the State of Connecticut, a per-
petual franchise for planting and cultivating shell fish in
acres of ground, located under the waters of Long Island Sound,
between the meridian boundary lines of the town of
in the State aforesaid, and south of the coast line established by
the first section of the act aforesaid, which grounds are more
particularly bounded and described, as follows, to wit:

Dated at , Connecticut, this
day of A. D. 19

Applicant.

GRANT OF FRANCHISE.

FROM
THE STATE OF CONNECTICUT.

Received for Record
at h m M., and recorded in
vol. on page of Commissioners Records.
by

Clerk.

resident of the State of Connecticut, pursuant to An Act entitled an Act establishing a State Commission for the designation of oyster beds, passed by the General Assembly at its January session, A.D. 1881, ha made application to the Commissioners of shell fisheries of the State of Connecticut for a grant of a perpetual franchise for planting and cultivating shell fish in the grounds herein-after bounded and described, wherein he represent that he ha resided in the State of Connecticut more than one year next preceding the date of said application; that the said grounds are undesignated grounds and are not now, and for ten years last passed have not been, natural clam or oyster beds, and have not been designated according to the provisions of the said act as natural oyster, clam or mussel beds; that he wish and intend to use said grounds for planting and cultivating shell fish, which application is dated the day of A. D. 1 ; and was filed with the clerk of said Commissioners on the day of A. D. 1 , as appears by the note placed thereon by said clerk; and whereas, a written notice, stating the name and residence of said applicant , the date of filing the said application, the location, area and description of the grounds applied for, having been posted by said clerk for twenty days in the office of the town clerk of the town of within the meridian boundary lines of which said grounds are located, for all persons to file objections, if any they have, to the granting of the grounds applied for:

AND WHEREAS, no valid objections having been made thereto, and the area of said grounds not being, in the opinion of the Commissioners, of unreasonable extent, the said grounds having been surveyed, located and delineated on the map of the Commissioners; the actual costs of surveying and mapping said grounds, amounting to dollars, and the price of said grounds at one dollar per acre, amounting to dollars, having been paid by said applicant to the Commissioners for the benefit of the State of Connecticut. Now, therefore

Know all men by these presents, THAT The State of Connecticut, acting by and through the Commissioners on shell fisheries, in consideration of the premises and especially for the sum last above mentioned, duly received from said applicant , hath given and granted and by these presents doth give and grant unto the said applicant and to i legal representatives forever a perpetual franchise for the planting and cultivation of shell fish in the acres of ground applied for, bounded and described as follows, that is to say:

To have and to hold the same unto the said grantee and legal representatives, to the only use and behoof of the said grantee and legal representatives forever:

PROVIDED always, that said grounds have not heretofore been designated and are not now, and for ten years last passed, have not been natural clam or oyster beds, and have not been designated according to the provisions of the said act as natural oyster, clam, or mussel beds, and provided further that this grant shall not interfere with any established right of fishing and that said grantee shall at once cause the said grounds to be plainly marked by stakes, buoys, ranges or monuments, which stakes, buoys, ranges or monuments shall be continued by the said

grantee and legal representatives; and provided further, that this grantee or holder of said grounds shall actually use and occupy the same for the purposes named in good faith within five years from the date hereof, and for no other purpose; and provided further, that this grant is accepted by said grantee subject to all the provisions of the act aforesaid.

In Witness Whereof, the Commissioners of shell fisheries, in behalf of the State of Connecticut, by virtue of the authority vested in them by said act, have hereto set their hands and seals this

Signed, Sealed and Delivered in Presence of

STATE OF CONNECTICUT, }
COUNTY OF NEW HAVEN, } ss. New Haven, A.D.

Personally appeared,
Commissioners of Shell Fisheries of Connecticut, signers and sealers of the foregoing instrument and severally acknowledged the same to be their free act and deed in behalf of the State of Connecticut and in their own behalf, before me.

REPORT TO THE
STATE BOARD OF HEALTH
ON THE
SANITARY INVESTIGATION
OF
OYSTER GROUNDS
IN THE
NEW HAVEN HARBOR

BY
JAMES A. NEWLANDS AND GEORGE C. HAM

1910

SANITARY INVESTIGATION OF OYSTER GROUNDS IN THE NEW HAVEN HARBOR.

Connecticut State Board of Health, Hartford, Conn.:

GENTLEMEN:—The following is a report on the sanitary investigation of the oyster grounds in the New Haven Harbor ordered by your honorable body at the request of the Board of Equalization and Oyster Investigation Commission.

It was the desire of this Commission that a general investigation be made into the sanitary condition of the oyster grounds along the Connecticut coast. The importance of such an investigation was understood, but as there were no funds available for this work a committee was appointed by the Board to determine what might be done. At a meeting of this committee, held in June, it was decided that the investigation of watersheds in the State, then in progress, should be discontinued for a short time and that the writers should undertake a preliminary investigation of conditions in the New Haven Harbor.

The investigation has been divided into the following heads:

- 1 A study of the literature bearing upon the relation of oysters to the dissemination of disease.
- 2 A general sanitary survey of the New Haven Harbor.
- 3 Laboratory investigation of the water and oysters in the New Haven Harbor.

A STUDY OF THE LITERATURE BEARING UPON THE RELATION OF OYSTERS TO THE DISSEMINATION OF DISEASE.

A study of the literature reveals only a few references to oysters as carriers of disease germs previous to 1880. In that year Cameron, in a paper entitled "Oysters and Typhoid Fever" read before the British Medical Association, suggested that outbreaks of typhoid fever and cholera might be caused by eating oysters. In 1893 Thorne-Thorne, in a report to the Local Government Board, wrote that, in his opinion, certain cases of cholera which had occurred that year at various inland towns in England were due to eating contaminated oysters from beds at Grimsby, where there had been a small cholera epidemic. Following the suggestions embodied in this report the English

Government began a series of investigations which have made many important additions to our present knowledge of the subject.

In this country in 1894 the well-known epidemic of typhoid fever at Wesleyan University was reported by Dr. H. W. Conn in the 17th Annual Report of this Board and as the epidemic was shown to have been caused by oysters from the New Haven Harbor a brief summary of the report may be of interest. The facts briefly are as follows: On October 12, 1894, banquets were given by a number of the college fraternities in connection with initiation ceremonies. Within less than a month twenty-five cases of illness were reported among students belonging to three of the fraternities, and of these twenty-three cases were diagnosed as typhoid fever. No evidence could be found to show that the water, milk, ice, or vegetables used at the banquets had been infected. The water was obtained from the city supply and the other articles of food were purchased from dealers who had also supplied many of the townspeople and some of the other fraternities where no illness had been reported. Suspicion was turned to raw oysters, which were served at the three fraternities where the typhoid cases had appeared, and it was found that they had been obtained from a local dealer. This dealer had also supplied one other fraternity, but the oysters in this case were cooked and no ill effects were reported. Inquiry regarding two other cases of typhoid fever which occurred in the town at this time developed the fact that both patients had eaten raw oysters purchased from the above-mentioned dealer. Upon further investigation it was found that this shipment of oysters had been taken from grounds in Long Island Sound and later floated in the Quinnipiac River a short distance from a private sewer draining a house where there were then two cases of typhoid fever. It was also found that a portion of the same lot of oysters had been shipped to Amherst, Mass., where they were served at a fraternity banquet held on the same evening as the Wesleyan banquets, and six cases of typhoid fever developed among those who ate oysters. The chain of evidence connecting this epidemic with the use of contaminated oysters appears to be complete.

Again in 1902 the famous oyster epidemics at Winchester and Southampton, England, were proven beyond reasonable

doubt to have been caused by contaminated oysters taken from grounds at Emsworth. Here again we have to deal with banquets given in different cities where the only common source of infection appears to have been contaminated oysters. Of the two hundred and sixty-seven guests at these banquets one hundred and eighteen were attacked with intestinal disorders and twenty-one cases of typhoid fever developed, five of which were fatal.

Although, as has been brought out by Mr. H. C. Rowe, in a paper on "The Wholesomeness of Oysters as Food," a great many sensational attacks have been made against oysters as carriers of disease germs which have been based on little or no evidence, yet the above-mentioned investigations and others, among which might be mentioned those by Thresh 1902, Marvel 1902, and Soper 1905, have brought out sufficient trustworthy evidence to show that contaminated oysters must be considered as a real factor in the dissemination of typhoid fever and other water-borne diseases. An estimate of the extent to which such illness is due to oysters would be impossible at the present time. The Royal Sewage Commission after an extensive investigation on this subject came to the following conclusion: "After carefully considering the whole of the evidence on this point, we are satisfied that a considerable number of cases of enteric fever and other illness are caused by the consumption of shell-fish which have been exposed to sewage contamination; but in the present state of knowledge, we do not think it possible to make an accurate numerical statement.

"Moreover an examination of the figures which have been placed before us as regards those towns in which the subject has been most carefully studied shows that there may be occasional errors. Indeed the witnesses themselves recognized that absolutely accurate figures were not obtainable.

"We are far from denying that isolated cases may have been due to contaminated shell-fish, but we must remember that the possibility of some of them being due to other causes cannot be altogether excluded."

In the above-mentioned cases, where oysters have been proven or reasonably suspected of being the cause of disease, it has been found that the oysters in question had been floated or grown in heavily polluted water where direct contact with spe-

cific infection could be proven or readily assumed. The Wesleyan epidemic is a case in point. Oysters had undoubtedly been floated in the contaminated waters at Fair Haven for a number of years previous to 1894 without any noticeable effect on the health of persons eating them, but specific infection of the water from two patients in a house nearby was followed by a serious epidemic.

The character of the contamination and the directness with which it is carried to the oyster are all important factors in the part played by the oyster in the transmission of disease. Quoting Houston, recorded in the Fourth Report of the Royal Sewage Commission, "A pollution trivial in amount but specific in character is much more dangerous than contamination gross in amount with nonspecific in nature. It is also probable that a pollution trivial in amount but specific in character and of recent sort, is more dangerous than a pollution gross in amount, specific in character, but of remote kind."

METHODS OF DETERMINING THE DANGER OF A GIVEN POLLUTION.

No method of direct estimation of the disease value of a given pollution has yet been devised and although the advent of the science of bacteriology has helped much in the solution of public health problems, it has failed, thus far, to give investigators a method for determining the presence or absence of disease germs in contaminated water or oysters except under rare conditions. The New York Department of Health, 1908, in a report on the "Sanitary Inspection of Shell-Fish Grounds in New York," reaches the conclusion that a standard based upon the presence or absence of disease-producing conditions in shell-fish beds and their contents is impossible at this time, and continue: "We are forced therefore, to rely for such action as may be advisable upon the basis of the estimation of the amount and distribution of the sewage pollution of a general character in relation to shell-fish beds and their contents, and to oyster drinking places. Nevertheless, making such a basis for action is fraught with no little danger, for the reason that the basis is an artificial one; and on the one hand, it is entirely possible that approval may be given under it to beds, drinking places and

indirectly to oysters and shell-fish, which may become the means of transmitting disease; and on the other hand, it is more than likely that beds, etc., may be condemned which are not in reality a menace to health and will not likely become so. In fact, justice to the oyster industry on the one hand, and to the public health on the other, demands that action on this basis shall not be taken except after the most careful and exhaustive investigations of an epidemiological, sanitary engineering, and biological character."

In the Fourth Report of the Royal Sewage Commission previously quoted we find the following statement: "The methods at present available to the bacteriologist do not permit of his detecting, except possibly in rare cases, the typhoid fever micro-organism either in sewage largely diluted with sea water or in shell-fish; neither do they enable him to measure, in any exact manner, whether the micro-organisms which he takes as his index of danger are of recent or remote intestinal origin. Moreover, there is no constant ratio between the numbers of the organism taken as an index and the numbers of the disease-producing organism in the typhoid intestine, in the raw sewage or in the mixture of sewage and estuary water. Mere numbers of *B. Coli* or any other particular micro-organism of sewage cannot, therefore, be said to have anything approaching an exact value as an indicator of the danger of disease, and we consider that before any working bacteriological standard can be applied further knowledge is necessary."

Definite evidence of sewage contamination, however, must be considered as "potential infection," and in order to form some basis for passing upon the quality of oysters which will be fair alike to the oyster industry and to the public health, certain investigators have classified their results to show different degrees of pollution, the final opinion regarding evidence of pollution being based upon a study of these results in connection with a careful sanitary survey of the grounds in question. In the report of the New York Department of Health previously quoted, the work of Dr. A. C. Houston, the Mass. State Board of Health, Dr. C. A. Fuller, and Dr. Geo. A. Soper have been compared, and although there are some differences in the methods of reporting results which make accurate comparison difficult, the differences in the standards suggested are not so

great as might be expected. Roughly, it may be said that the Mass. State Board and Fuller would consider positive tests for *B. Coli* in one cubic centimeter of the shell liquor as definite evidence of pollution, while Houston and Soper would require positive tests in one-tenth of a cubic centimeter for definite evidence.

After a large amount of investigation the Bureau of Chemistry of the U. S. Department of Agriculture has decided to condemn oysters sold in interstate commerce which show more than two samples out of five giving positive tests for *B. Coli* types of organisms in one-tenth of a cubic centimeter of the shell liquor. When oysters have been condemned on this standard, however, the examinations have been supplemented with an inspection of the beds from which the oysters were obtained, and a bacteriological examination of the water bathing the oysters from these localities.

At the annual meeting of the American Public Health Association held in September of this year, the Committee on "Standard Methods of Sanitary Shell-Fish Examination" gave considerable time to a discussion of bacteriological standards, but no definite action was taken.

The Rhode Island Shell-Fish Commission is now using the government ruling in passing upon the oyster grounds of that state, i.e. all oysters are condemned in which three out of five show the presence of colon bacilli in .1 of a cubic centimeter of shell water. Sanitary certificates are issued for all oysters that pass this standard. Professor Gorham, under whose direction the bacteriological investigations of the Commission are being carried on, also holds for special study those grounds where the sanitary survey shows that the conditions are dangerous although the oysters may be all right, and grounds where the results of analysis are bad although the sanitary conditions appear to be good. For such grounds a conditional certificate is issued which states that the oysters covered by such a conditional certificate are in a questionable area and require further study before being passed upon.

Too great emphasis cannot be placed upon the fact that the adoption of a bacteriological standard which will be fair alike to the oyster industry and to the public health must be determined in the light of data gathered from allied lines of investigation.

To quote from the admirable paper by George W. Fuller on "Shell-Fish and Typhoid Fever," "Epidemiology, bacteriology, sanitary chemistry, and hydraulic engineering are called to assist in the solution of this problem, in conjunction with those physical data usually called a "sanitary survey." * * * To consider one aspect of the case will not do, as such evidence might be misleading to such a degree as to do far more harm than good. In the future the engineer will especially be obliged to consider this question in further detail, and to coöperate in seeing to it that various sanitary surveys and samples for analysis have due regard for the physical side of the case, as, for example, the currents, tides, winds, relative volumes of sewage and of fresh and salt water (tidal prisms), velocity, dilution, effect of sedimentation and scouring, temperature, relative densities of water, stratification, and especially the period of time elapsing during the passage of sewage from the outfalls to the shell-fish beds and "drinking grounds."

The position taken by the Rhode Island Commission in adopting the Government ruling appears to us to be the logical one at the present time. It has the advantage of allowing the sale of oysters in interstate commerce from certified grounds, will protect the public health and will help bring back the confidence of the public in the use of this wholesome food, while those grounds lying within the condemned or questionable areas may be returned to use as rapidly as future investigations warrant such a change.

SANITARY SURVEY OF THE NEW HAVEN HARBOR.

The New Haven Harbor north of the breakwaters covers an area of 11.68 sq. miles. The inner harbor, i.e. that portion of the harbor north of a line between the "Jetty" and Fort Hale, has an area of 3.32 sq. miles. This portion of the harbor is quite shallow, having an average depth of about five and a half feet and a capacity of about 523,000,000 cu. ft. at low tide and 1,080,000,000 cu. ft. at high tide or a little over twice the low tide capacity.

It was apparent that the incoming tide, entering the outer harbor by the openings between the breakwaters and between breakwaters and shore, would flow strongly up the main channel

and gradually spread to the shores. Also during the latter part of the flood tide some water would flow directly from the outer to the inner harbor over the dike, which is then submerged. The flow of the outgoing tide would appear to be practically the reverse of the incoming.

In order to determine whether there was any important variation from the apparent flow or currents which would particularly affect the flow from the sewer outlets to the oyster grounds, a number of float experiments were made.

Both ball and spar floats were used. The ball floats consisted of a six-inch, coppered, tin ball carrying a small flag on a staff set in the top and a tin vane suspended from a ring in the bottom by a fish line or wire to the required depth. The vanes were twenty-inch by ten-inch tin sheets set at right angles and held thus by four quarter-round wood mouldings. The mouldings projected about two inches below the vanes and were held together by being screwed into a heavy iron nut. Above the vanes the mouldings projected about six inches and were fastened by a wire run through a screw-eye in each piece. The four mouldings held the vanes firmly and the buoyancy of the wood above and the weight of the nut below tended to keep the vanes in a horizontal position. The bottom of the ball was weighted sufficiently to balance the weight of the flag before the vanes were attached. The weight of the vanes when submerged gave a pull on the line attached to the ball of about two pounds, which caused the ball to float nearly submerged, thus decreasing the effect of the wind.

This form of float was easily assembled and taken down, and as the depth of the vane could be readily altered by simply lengthening or shortening the lines, they were found very satisfactory.

The spar floats used were made of a wood spar, two inches in diameter and three and a half feet long. One end was split into quarters by two saw cuts ten inches deep and the two ten-inch by twenty-inch tin vanes were slipped into these cuts and fastened by staples. The spars floated about nine inches out of water and were painted different colors for easy identification. They also carried small flags.

The floats were started either singly or in groups of two to four. They were followed in a launch and their location taken about every hour, by cross ranges or with an angle mirror.

Thirty-three floats were started from seven different points during the investigation and were followed from two to seven hours. Many ran aground in the inner harbor, particularly those whose vanes were set over three feet deep. The more interesting results are shown on the accompanying plot No. 1.

In general the results of these float experiments indicate: 1st, That the flow from the Boulevard sewer in the early part of the ebb tide is southeasterly and is divided by the Shag Bank, part going down the main channel and part following the west side of the bank. Later, when the tide has fallen below the level of the dike and bar, the whole flow is down the channel to a point below Fort Hale whence most of the floats drifted easterly into Morris Cove.

2d. Floats set at the Meadow St. sewer outfall traveled very slowly, some not reaching the main channel in four hours on the ebb tide.

3d. Floats from Tomlinson's Bridge followed the general course of the channel.

4th. The maximum velocity found in the channel was about one mile per hour and the indications are that the distance through which the sewage travels from the outfalls on one outgoing tide does not exceed three miles and is usually less except for that portion which enters the main channel about mid tide.

The movement of the tides has little scouring action in the inner harbor except over the Shag Bank, where the current is quite rapid for a short period during each tide and the sand bar is kept comparatively free from organic deposits.

The West, Mill, and Quinnipiac rivers entering the inner harbor drain an area of 222 sq. miles, but these streams do not increase the flushing action of the tides to any great extent as the average daily run-off for the total drainage area is only about 31,000,000 cu. ft., or about 6 per cent. of the capacity of the inner harbor at low tide.

The Quinnipiac River or its tributaries receives raw sewage from outfalls at Wallingford and Southington, but at Bristol and Meriden the sewage is treated on sand filters before it is discharged into the stream. The New Haven sewerage system serving approximately 100,000 people, or about half the population on the harbor drainage area, discharges from seven outfalls along the west shores of the inner harbor and the Quinnipiac

River. There are also numerous private sewers or drains along the shores.

The effect of this method of sewage disposal on the oyster grounds in the inner harbor is apparent. Float experiments confirmed by laboratory results show that at certain stages of the tide sewage from the Boulevard sewer passes directly over the "Shag Bank," on which are located the most important oyster grounds in the inner harbor, and the time required for the sewage to travel from the outfall to the "Shag Bank" under these conditions is less than an hour. Certain grounds just north of the "Shag Bank" and within a few hundred feet of the Boulevard sewer outfall are still in use and it may be said literally that the oysters here are bathed in dilute sewage.

The west side of the harbor is in a very unsanitary condition. The sewers generally discharge above the low water level, and at low tide, during the summer months, foul odors due to the decomposition of the sewage sludge which settles on the bottom of the harbor about the outfalls can be noticed for a considerable distance from the shore. This is especially true of the Meadow St. outfall, where the sewage runs over a sludge-covered area laid bare at low tide.

Floating garbage of all kinds, boxes and barrels, and masses of feces can be seen almost any day on the surface of the harbor waters. During this investigation one of the writers saw five boys bathing off an oyster-house dock a short distance north of the Ferry St. Bridge. The boys were formed in a circle, in the center of which was a floating mass of feces several inches in diameter. It requires little argument to convince the most skeptical that bathing under such conditions is unhealthful.

The outer harbor, i.e. that portion of the harbor south of the "Jetty," receives a small amount of drainage from private drains at and east of Savin Rock and also along the shores of Morris Cove and Lighthouse Point, but as will be shown by the laboratory results, the most serious contamination comes from the pollution in the inner harbor, which is rapidly encroaching upon the safety of the grounds beyond the breakwaters.

LABORATORY INVESTIGATIONS.

Through the courtesy of Jeremiah Smith & Sons, oyster dealers, a room in one of their buildings at City Point, New

Haven, was placed at our disposal, where a laboratory was equipped for the examination of water and oysters. The routine work began on June 29 and was brought to a close on September 30. A total of nine hundred and forty-five samples was examined, consisting of six hundred and sixty-eight water samples and two hundred and seventy-seven oysters.

The laboratory work was in charge of Mr. Wm. F. Wells during July and August and Mr. E. A. Robinson during September, to both of whom we are indebted for the careful manner in which this work was completed. We are also indebted to the New Haven oystermen who so willingly coöperated with us in the work.

During the early part of the investigation water samples were collected from forty-seven stations indicated on the accompanying maps. In the inner harbor samples were taken at one depth, usually about three feet below the surface. In the outer harbor, where the water is deeper, samples were usually taken at two depths, i.e. about three and fifteen feet below the surface. The samples were collected in vacuum tubes now commonly used for this work, lowered in a lead tube to the desired depth and broken open.

The numbers of bacteria in the water were determined on standard gelatin and agar at 20° C. and 37° C., respectively. Jackson's Bile medium was used as a presumptive test for *B. Coli* in both water and oyster work. Confirmatory tests were not made as the bile medium results have been shown to be a fair index of the *B. Coli* content and are sufficiently accurate for preliminary work of this nature. Samples of the shell liquor were obtained by drilling through a sterilized portion of the shell near the hinge with a sterile drill. The amount of oxygen dissolved in the water of the inner harbor was determined at various stations and in this work the Winkler method was used.

Data regarding air currents, percentage of land water in the harbor water, stage of tide when samples were taken, etc., have been tabulated and placed on file in the office of the Board, as they would require too much space to be included in this report. The percentage of land water to sea water was determined by means of a salinometer devised by the New York Sewerage Commission and the results calculated from a table gotten up by that Commission.

INTERPRETATION OF RESULTS.

It is not to be expected that in a preliminary investigation covering a period of only three months enough data could be obtained to form any definite basis for deciding within narrow limits whether a given oyster ground is safe or dangerous. Enough data have been obtained, however, to show that all the grounds in the inner harbor and some of those in the outer harbor are very badly polluted and could not be passed by any reasonable standard for the cultivation of market oysters. If conditions here are representative of those to be found at other places along the Connecticut coast, it would seem that further investigation along these lines is of vital importance both for the benefit of an important industry and for the protection of the public health.

For reasons previously stated we have based our classification of unsanitary grounds on the government ruling. Grounds from which the oysters show a *B. Coli* content greater than the limit of the government regulation, but not positive in dilutions greater than 0.1 of a cubic centimeter, are considered as questionable areas to be held for more careful study. A map showing the oyster grounds thus classified has been submitted to the State Board of Health.

In reporting the *B. Coli* results recorded in Table No. 1 estimates of the *B. Coli* content per cubic centimeter of water or shell liquor were obtained from averages of all the samples examined. The "Committee of the American Public Health Association on Standard Methods of Shell-Fish Examination" has under consideration a numerical system for recording bacteriological results, but the system had not been fully decided upon at the time of writing this report. A common system of recording results is greatly needed, as the diverse methods now in use make a comparison of the work of different investigators difficult and in some cases impossible.

On the basis of the method used in recording our results the government regulation would condemn grounds when the oysters showed a greater *B. Coli* content than 4.6 per cubic centimeter of the shell water. Grounds from which oysters are taken which show average *B. Coli* counts between 4.6 and 10. per cubic centimeter are held for a more careful investigation.

TABLE OF RESULTS.

Station.	WATER.				OYSTERS.		
	Samples taken.	Av. Number Bacteria Per c. c.		Average Number B. Coli* Per c. c.	Average Number B. Coli* Per c. c.	Number Oyster Samples.	Character of bottom.
		37° C.	20° C.				
Ferry St. Bridge	12	210.	1260.	43.	..	..	Soft.
Tomlinson Bridge	15	910.	2650.	34.	..	..	"
No. 1	15	510.	1680.	51.	..	..	"
" 2	15	375.	910.	73.	..	..	"
" 3	16	255.	835.	9.	72.	16.	"
Buoy 10	15	155.	450.	10.	..	..	"
No. 4	15	160.	1720.	9.	..	..	"
" 5	17	615.	1340.	74.	308.	13.	"
Buoy 5	23	315.	715.	15.	..	..	"
" 8	15	205.	410.	8.	..	..	"
No. 6	16	145.	485.	8.	37.	6.	Seaweed.
" 7	21	215.	740.	29.	425.	11.	Hard.
" 9B	11	220.	260.	7.	64.	10.	"
" 9A	13	100.	185.	9.	46.	10.	"
" 9	12	195.	200.	17.	37.	10.	"
" 7A	11	120.	240.	10.	255.	11.	"
" 8	16	180.	270.	7.	370.	6.	....
" 10	23	300.	615.	9.	100.	1.	Soft
" 11	11	405.	510.	8.	10.	4.	"
Buoy 6	21	815.	1690.	9.	..	..	....
" 3	17	175.	590.	6.	291.	8.	Hard.
No. 12	14	620.	1190.	4.	6.	5.	"
" 13	7	240.	120.	10.	10.	8.	"
" 14	12	285.	1100.	1.—	7.	8.	"
Buoy 4	7	375.	1400.	4.	..	..	....
No. 15	7	455.	1680.	1.	45.	15.	Hard.
" 16	14	280.	1025.	1.—	1.—	3.	Soft.
" 17	14	300.	1260.	1.—	..	..	Hard.
" 19	1	800.	300.	..	..	..	....
" 20	10	135.	860.	1.—	10.	8.	Hard.
Buoy 2	11	375.	905.	2.	..	..	....
No. 22	8	305.	560.	1.—	7.3	3.	Hard.
Buoy 1	6	115.	995.	1.—	4.	12.	"
No. 18	10	255.	675.	1.—	..	..	....
" 24	4	710.	1340.	4.	9.	10.	Hard.
" 23	6	450.	240.	1.—	..	..	"
" 25	2	130.	1000.	1.—	..	..	....
" 26	5	130.	465.	1.—	..	..	....
" 27	10	630.	695.	1.—	..	..	Soft.
" 28	4	415.	1400.	1.	4.	3.	Mud & sand.
" 29	5	370.	1700.	1.—	..	..	Soft.
" 30	5	185.	440.	1.—	1.—	15.	Hard.
" 31	7	320.	130.	1.—	1.—	15.	"
" 32	5	70.	1050.	1.—	3.	15.	"
" 33	4	485.	405.	1.—	1.—	10.	"
" 34	4	535.	495.	1.—	1.	10.	"
" 35	4	120.	270.	1.—	1.	15.	Sticky.

* Jackson's Lactose Bile presumptive test used.

Minus sign after figure 1. indicates that the average was less than 1.

A study of Map No. 2 shows that on the basis of these classifications grounds shaded in red are definitely polluted. The area shaded in green represents those grounds lying between the limits of the two classifications, which should be given further study. Oysters taken from either of these areas are liable to be condemned if found on sale in interstate trade.

The area shaded blue represents those grounds which pass both classifications and from which oysters may be taken for sale in interstate trade.

In drawing lines between the different classes of grounds the divisions had to be more or less arbitrary divisions, as we were unable to get data in such a short period to show the condition of oyster grounds at points between the stations from which the lines were drawn. A short series of examinations, however, will be sufficient to supply data for changes which may be found necessary.

According to these classifications approximately 1506 acres of private oyster grounds show definite evidence of the presence of sewage contamination and should not be used for growing market oysters unless the pollution is removed.

An additional area of about 579 acres does not pass the government regulation, but is within the other classification limit.

It is probably true also that a considerable portion of the natural grounds are seriously contaminated by polluted water, which passes over the "jetty" dike as indicated by the three sets of oyster samples examined on the last day of the investigation from stations thirty-six, thirty-seven, and thirty-eight, but no estimate of the polluted area could be made from these results.

GENERAL CONCLUSIONS.

While further work will be required in the outer harbor to determine the effect of pollution along the shores and also the condition of the natural grounds, we believe the results of this investigation show in a general way the present condition of the private beds.

In conclusion we would again call your attention to the very dangerous condition of the oyster grounds in the inner harbor and a portion of the outer harbor near the main channel. Oysters showing hundreds of colon bacilli per cubic centimeter

of shell liquor from grounds where physical evidence of sewage contamination can be readily demonstrated are a menace to the public health and a detriment to the oyster industry, and the use of such grounds for raising market oysters should be prohibited until they are made safe and satisfactory by the removal of such pollution.

It is not within the province of this report to determine the feasibility of removing sewage pollution from the oyster grounds in the inner harbor, but methods can and should be adopted for improving the present unsanitary condition of the inner harbor and to prevent, at least, further encroachment upon the valuable oyster grounds now in danger in the lower harbor and beyond the breakwaters.

Respectfully submitted,

JAS. A. NEWLANDS,

Chemist State Board of Health.

GEO. C. HAM,

Sanitary Inspector.

November 30, 1910.

INDEX

	Page
A	
Acknowledgments	81-82
Attorney-General's opinion on power of oyster commission	9-12
B	
Blank and letter sent to private growers	12-15
Blank sent to natural growers	46-47
Blank sent by Shell-Fish Commissioners to applicants for oyster franchises	103-105
Board of Equalization appointed an Oyster Commission by Legislature	3, 10
Board of Health, New Haven, on oyster regulations	99
State	55, 58
Buoying	
Natural beds	33-34
Recommendations	42-44
Table, showing the cost of	34
Bureau of Chemistry	
Decisions concerning oyster-condemnation	114
Bureau of Fisheries, Federal	77-80
Comparative financial tables	78
Table showing statistics for year 1910	77
D	
Dangers from oyster pollution, methods of determining	112-115
Department of agriculture, United States	92-95
Dairy score card of	92-93
Diseases caused by oysters	
Epidemic	110-111
Typhoid fever	110
Dissemination of diseases by oysters	
Literature on	109-111
E	
Examination, bacteriological, of oysters	50-51
Food inspection decision written after	51-52
Stiles, Dr. G. W., on sewage-pollution in connection with	51
F	
Federal Bureau of Fisheries	76
Franchise taxation	16-18
Method of	18
Revaluation necessary	17-18
Variation in assessment	17
H	
History of the oyster industry in Connecticut	3-9
Capitol contests	5
Cultivation	7
Early methods	7, 8
Experiments	8, 9

Page.

For residents only	4
Oyster developments	6
Privilege of transplanting	4
State Commission	5
State map work	5, 6
Two-acre law	4, 5
Vested rights	4

I

Inspection, scientific, of oysters	
Views of Dr. Harvey W. Wiley on	67-68
Inspection trip made by Governor Weeks, Board, <i>et al.</i>	9
Inspectors of mud dumping	31-33
Expense of, unwarranted	32
Recommendation concerning	33
Should be appointed by State and vested with same power as federal	32
Statute provisions relating to	32
Table showing cost of	33
Interpretation of laboratory results	
Sanitary and unsanitary grounds determined by federal rulings	120

L

Laboratory investigations	
By whom carried on	119
Data determined	119
Samples, how obtained	119
Law of Massachusetts concerning pollution of streams	99-100
Law of New Jersey on oyster propagation	73-74
Law of Virginia concerning oysters	100-102
Laws of Connecticut concerning oyster franchises	74-76
Recommendation concerning	74-76
Letter received by the Board from Dr. E. H. Jenkins concerning oyster investigation	69-70

M

Maps	80
Mud dumping, inspectors of	31-33

N

National Association of Shell-Fish Commissioners	
Papers read at meeting of	63
Resolution adopted by	64
Natural growers	
Blanks sent to	46-47
Restriction recommended in regard to licensing of	48
Statistics pertaining to	47-48
Natural oyster beds	
Licenses, given only to State residents, cost of, etc.	44
Number and names of	44
Recommendation concerning new method of taxation of	49-50
Receipts and expenses for sixteen years of	49-50
Views of B. Frank Wood on	44-46
New Haven Harbor	
Classification of oyster grounds into sanitary and insanitary...	120
Maps of	122

New Haven Harbor— <i>cont.</i>	Page
Report concerning	115-118
Sanitary investigations of oyster grounds	120
Sanitary surveys of	115-118
Sewage-pollution of	112
Table giving data of	122
O	
Opening houses	60-61
Employees	60-61
Lack of neatness apparent, in some	62
Oysters, how contaminated	61
Recommendation concerning	63
Opinion of Attorney-General on Commission to investigate oyster properties	9-12
Oysters, bacteriological examination of	50-51
Oyster beds, natural	44-46
Oyster Commissioners, acting as board of relief	
Applications to, etc.	20, 21
Blanks sent by	19-20
Hearings of	20
Notice sent by	19
Public hearings of	23, 24
Oyster contamination	
Conclusions relating to	123
How explained	122-123
Oyster franchises	
Recommendation of Board relative to	30
Taxation of	41-44
Oyster grounds	
Pollution caused by sewerage infection	58-59
Recommendation concerning	60
Should be inspected by State Board of Health	60
Oyster Growers' and Dealers' Association	
Papers read at meeting of	65
Resolution adopted by	67
Views on State inspection	66
Oyster industry, Connecticut	
Comparison with Rhode Island	26-28
Peculiarities of	24, 25
Table showing rents received from Rhode Island lands	29
Transference of seed	24, 25
Oyster inspection, scientific views of Prof. Coe on	70-73
Oyster investigation, scientific	69-70
Letter written by Dr. E. H. Jenkins concerning	69-70
Oyster laws of	
Louisiana	89
Rhode Island	89-92
Oyster police	
How paid	31
Law authorizing Commissioners to appoint	30
Present system not effective and remedy too expensive	31
Recommendation concerning	31
Oyster properties	
Early taxation of	37-41
Regulations of various states on taxation and ownership of	34-37
Oyster regulations of	
New Haven Board of Health	99
State of Virginia	100-102

Oyster propagation	
New Jersey law on	73-74
Oyster set	28-29

P

Police, oyster	30-31
Pollution of streams	
Law of Massachusetts concerning	99-100
Proposed leasing system of the natural beds	49-50
Private growers	
Blank and letter sent to	12-15
Statistics received from	15-16

R

Recapitulation	
Attitude of Board	85, 86
Federal requirements	84
Practicality of recommendations	85
Recommendation concerning	84-86
Recommendations of Board, summary of	81-84
Rhode Island blank for oyster house inspection	94-95
Rhode Island Shell-Fish Commission	
Condemns oysters by federal rules	118

S

Sanitary investigation of oyster grounds in New Haven Harbor ...	109-123
Sanitary survey of New Haven Harbor	
Floats used and location of	116, 117
Shell-Fish Commissioners	
National Association of	63-64
Recommendation concerning number of	80
Shell-fish, the floating of	53-55
Sheffield Scientific School fitness for bacteriological studies	70
Statute appointing State Board of Equalization an Oyster Com-	
mission	3, 10
Suggestions to oyster house owners by State of Rhode Island	95-99
Summary of Board's recommendations	81-84
System of taxation proposed for natural beds	49-50
Advantages of new	50
Leases	
Terms of	49
To whom granted	49

T

Table showing results of scientific investigation of New Haven	
Harbor	121
Table showing estimated receipts under new system of taxation	79
Taxation, early, of oyster properties	37-41
Extracts from previous shell-fish reports, on	
Assessment difficulties	39-40
First taxing year	38-39
Objection, futile, of large owners	40-41
Taxation, a method of	37-38
Taxation and ownership of oyster properties in different states....	34-37
Connecticut	35
Delaware	35

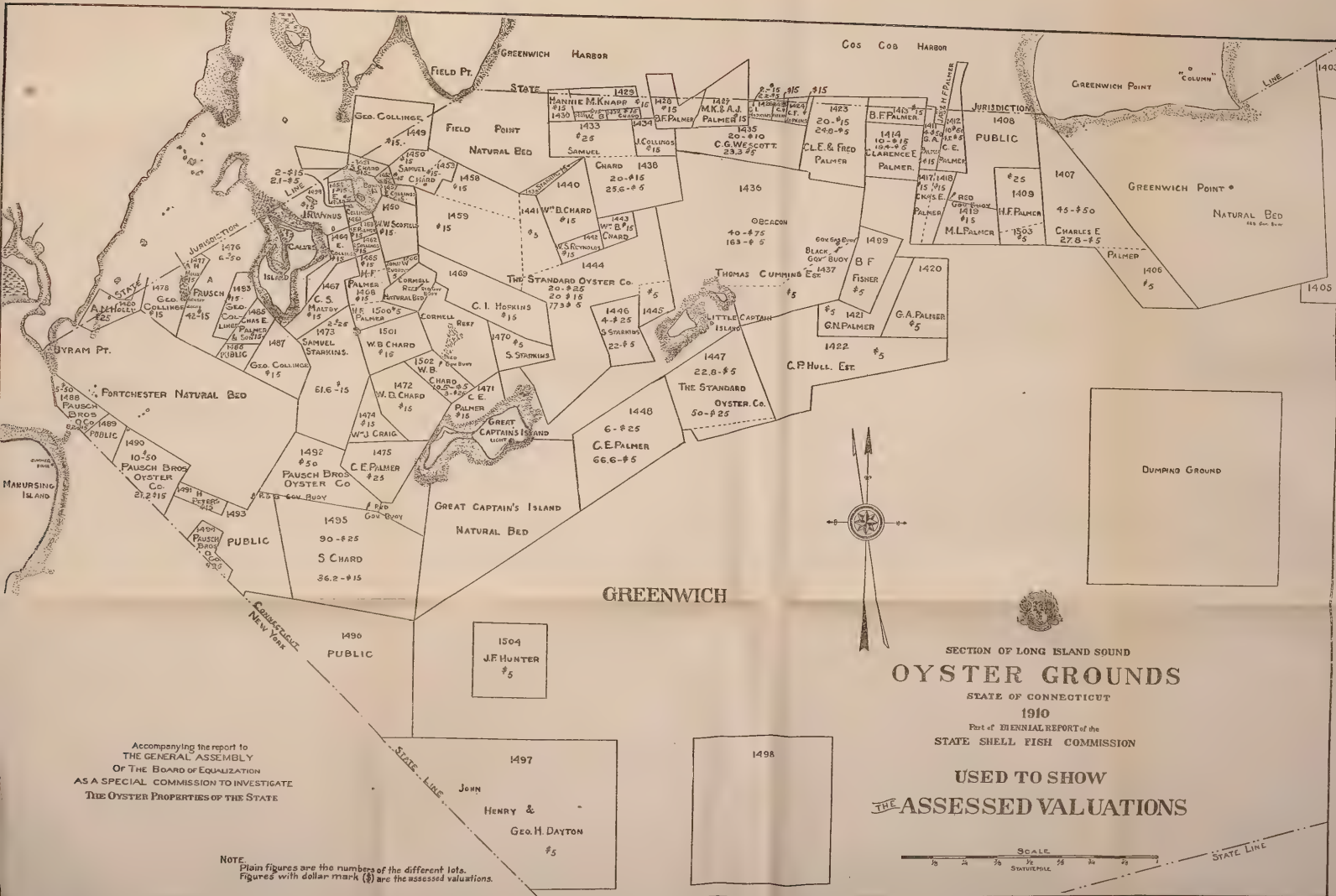
Taxation— <i>cont.</i>	Page.
Florida	35
Louisiana	35
Maine	35
Maryland	35
Massachusetts	36
New Jersey	36
New York	36
North Carolina	36
Rhode Island	36
Texas	36
Virginia	37
Taxation of oyster franchises	
Complaints pertaining to	41-42
Defects in basis of	42
No equity possible in present system of	41
Recommendations concerning a system of	42-44

V

Valuation of oyster grounds, minimum	21, 22
Views of	
Dr. H. W. Wiley on scientific oyster inspection	67-68
Prof. Coe on field for scientific investigation in oyster inspection	71-73

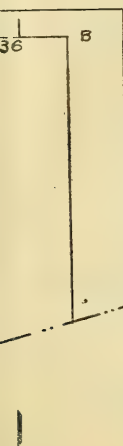
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20-10		10
WESGOTT F & Co		19.



MAP NO. 1





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Accompanying the report to
THE GENERAL ASSEMBLY
OF THE BOARD OF EQUALIZATION
AS A SPECIAL COMMISSION TO INVESTIGATE
THE OYSTER PROPERTIES OF THE STATE



STATE OF CONNECTICUT
1910
Part of BIENNIAL REPORT of the
STATE SHELL FISH COMMISSION

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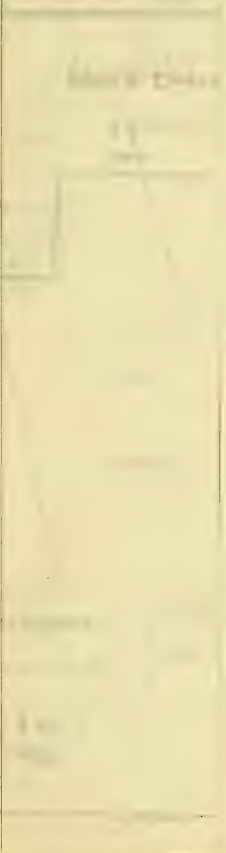
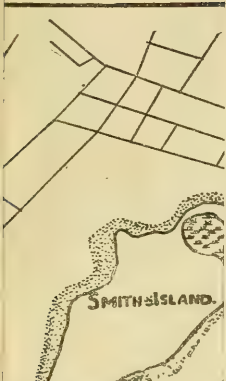
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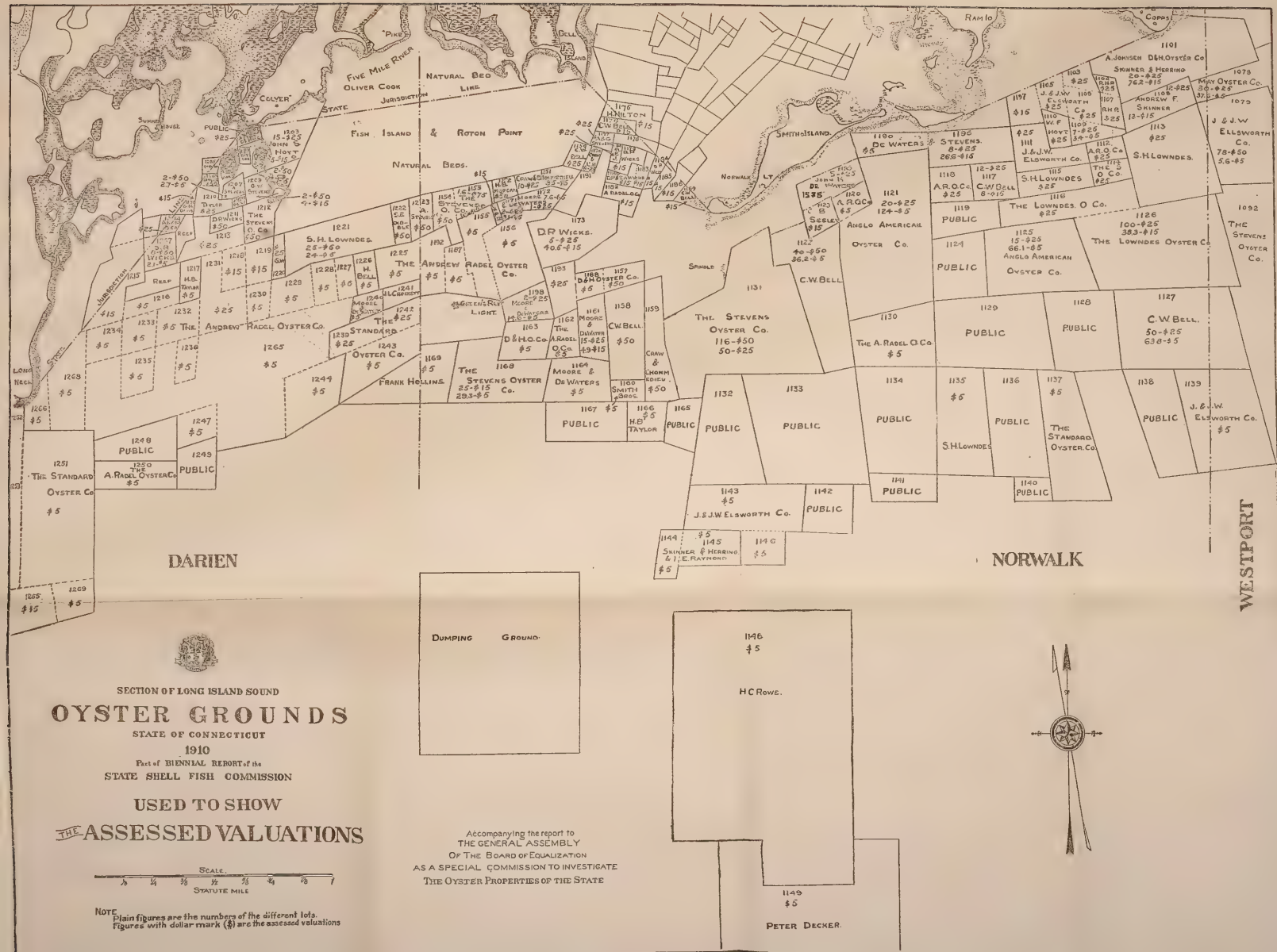
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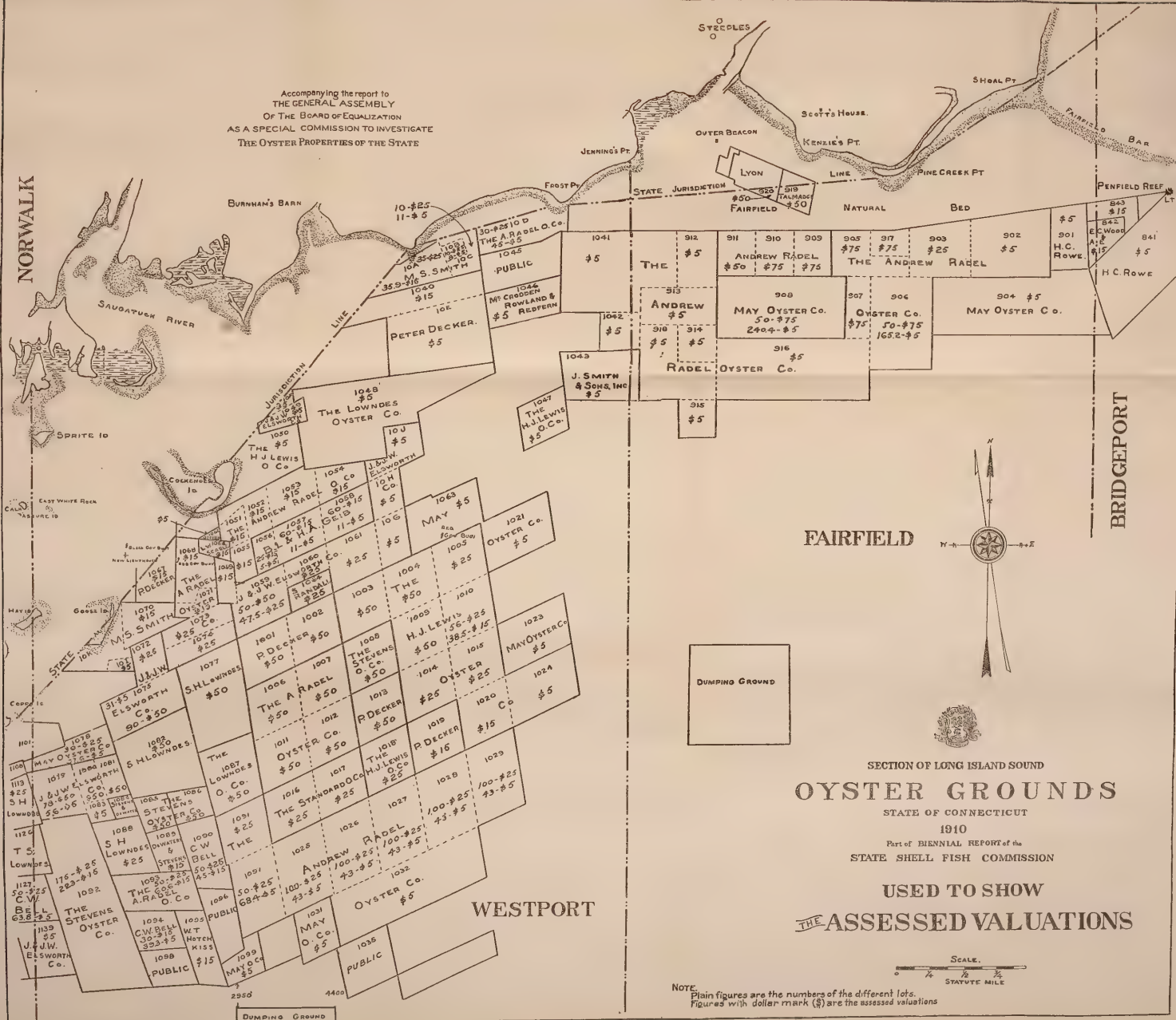




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NORWALK



FAIRFIELD

BRIDGEPORT

SECTION OF LONG ISLAND SOUND

OYSTER GROUNDS

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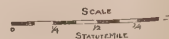
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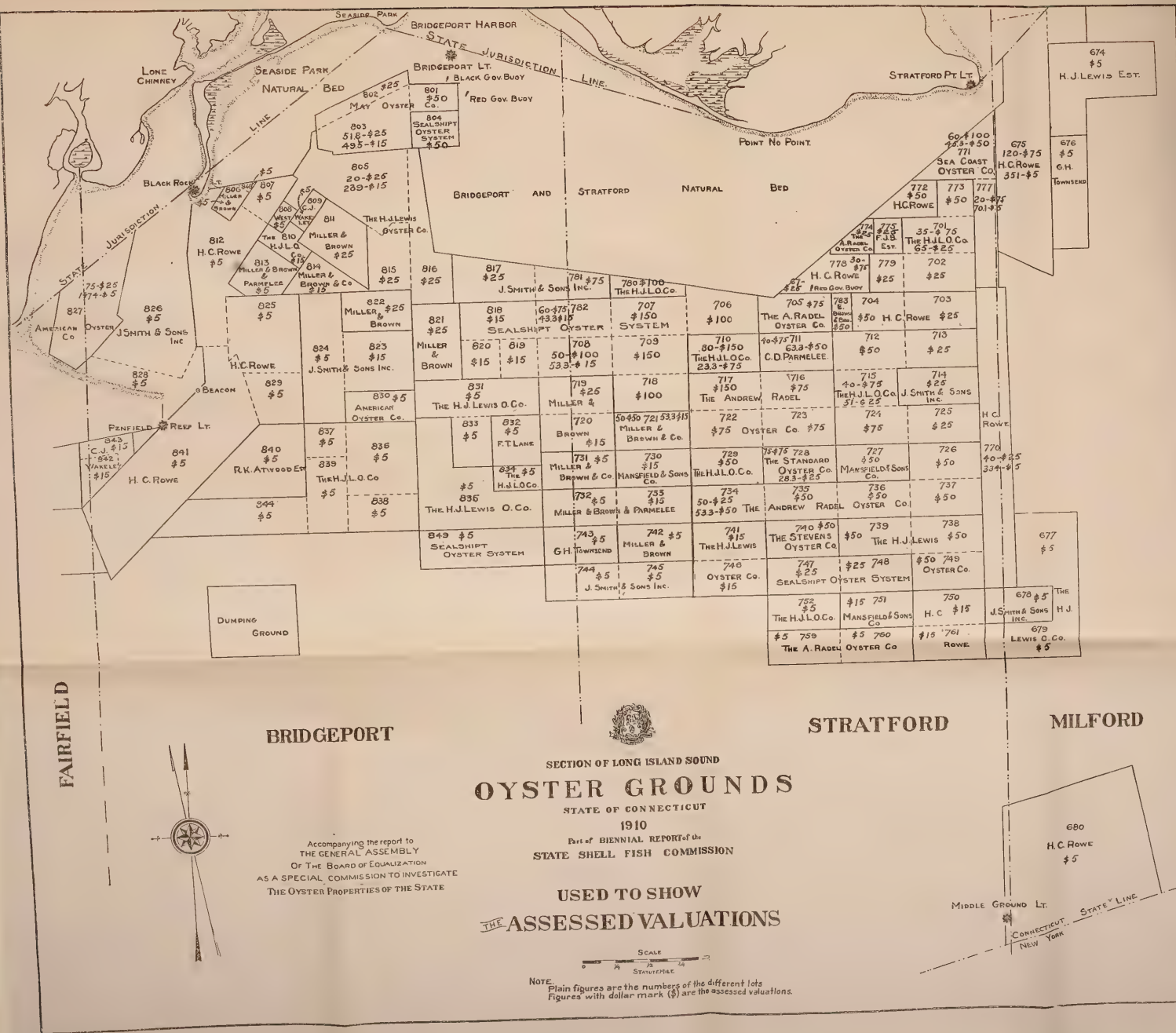
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THE ASSESSED VALUATIONS

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THE OYSTER PROPERTIES OF THE STATE



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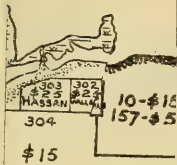
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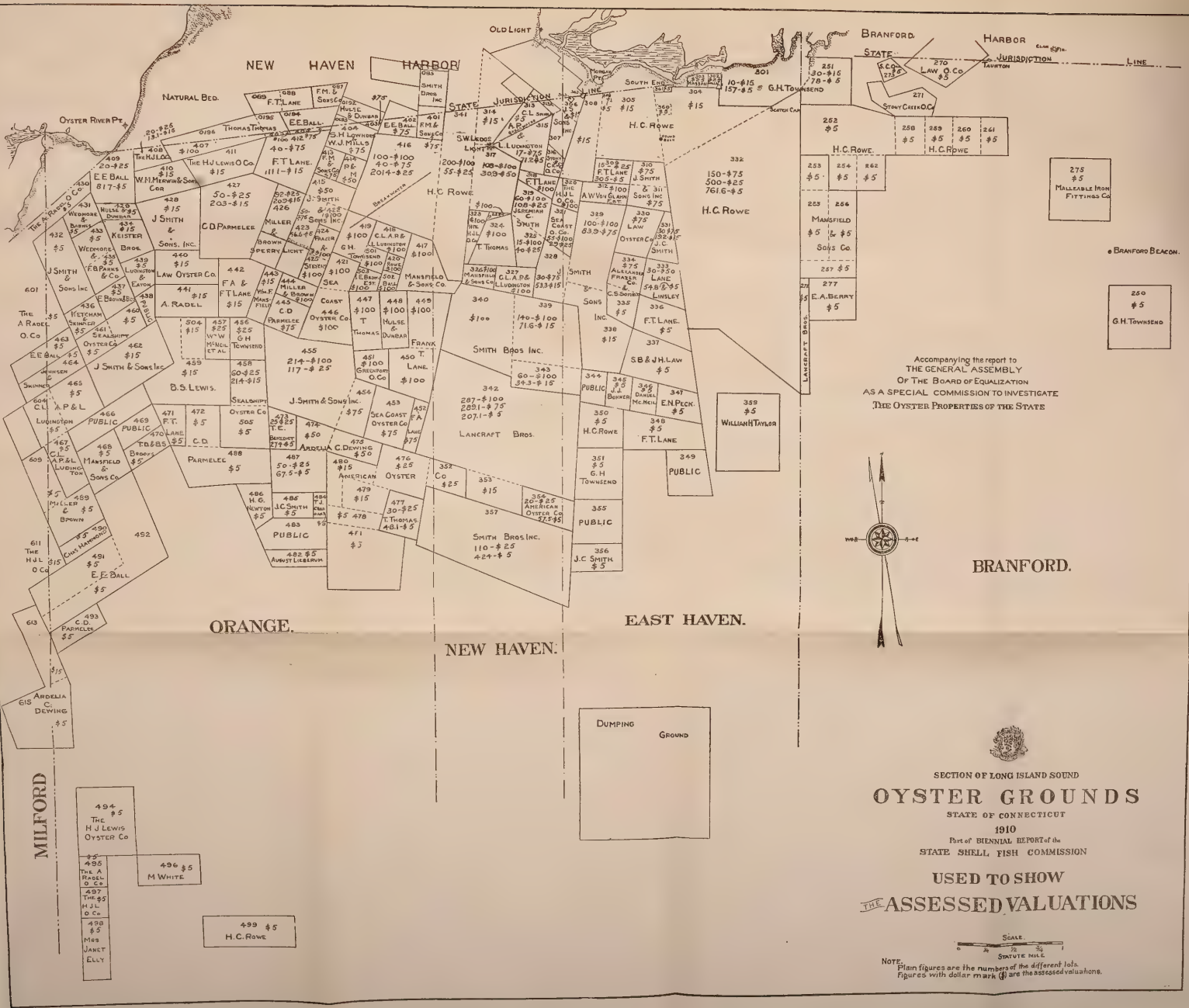
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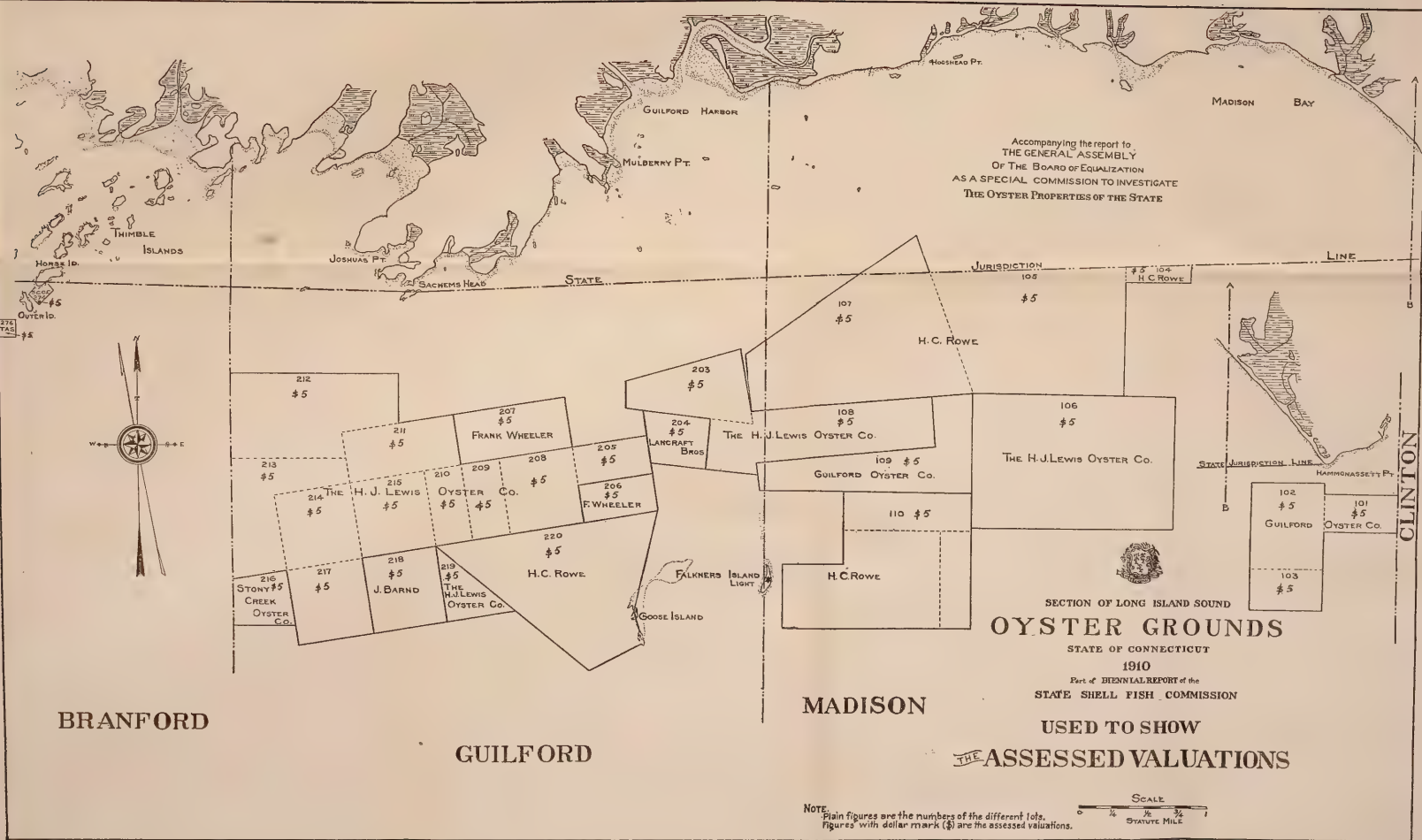
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MAP NO. 8.

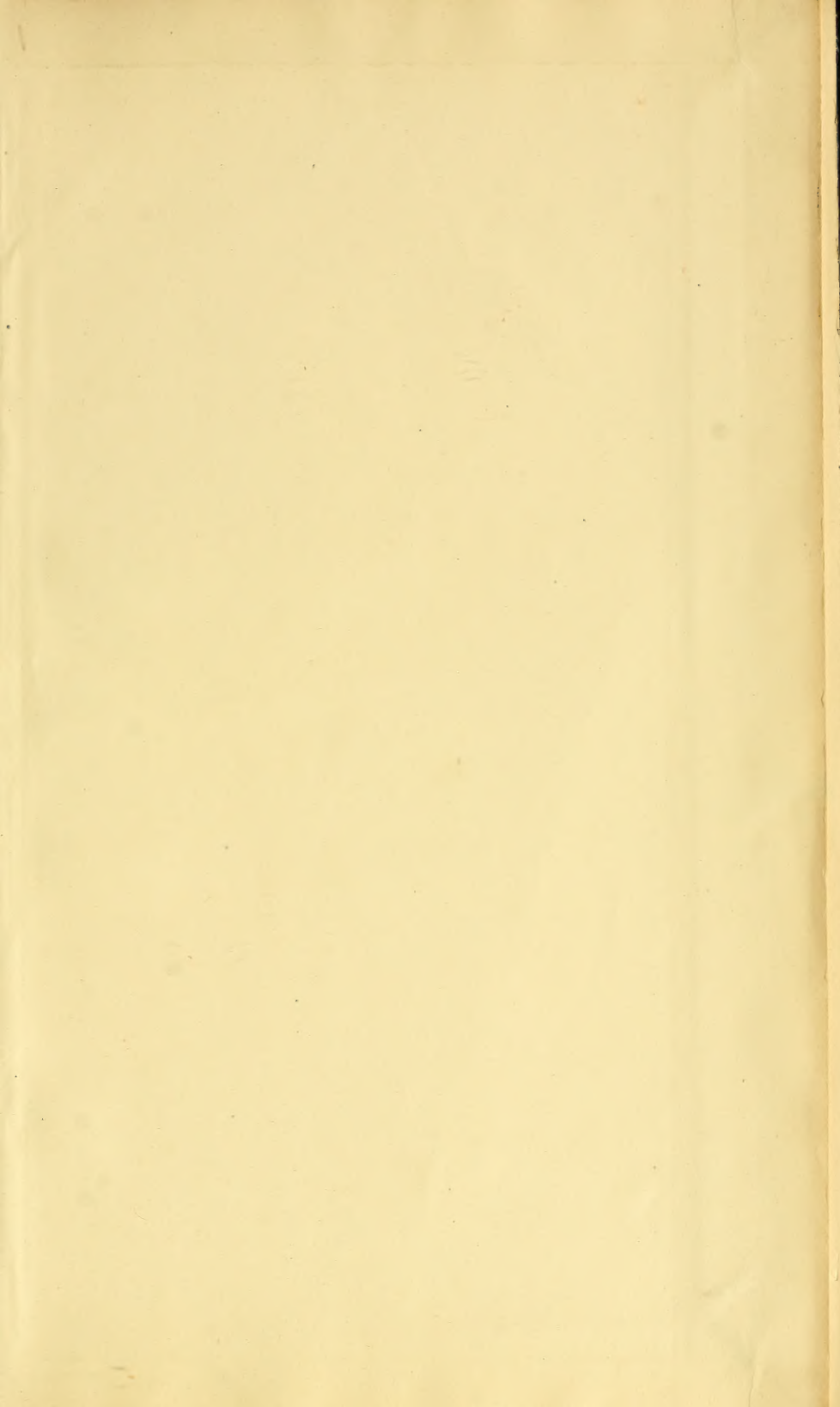


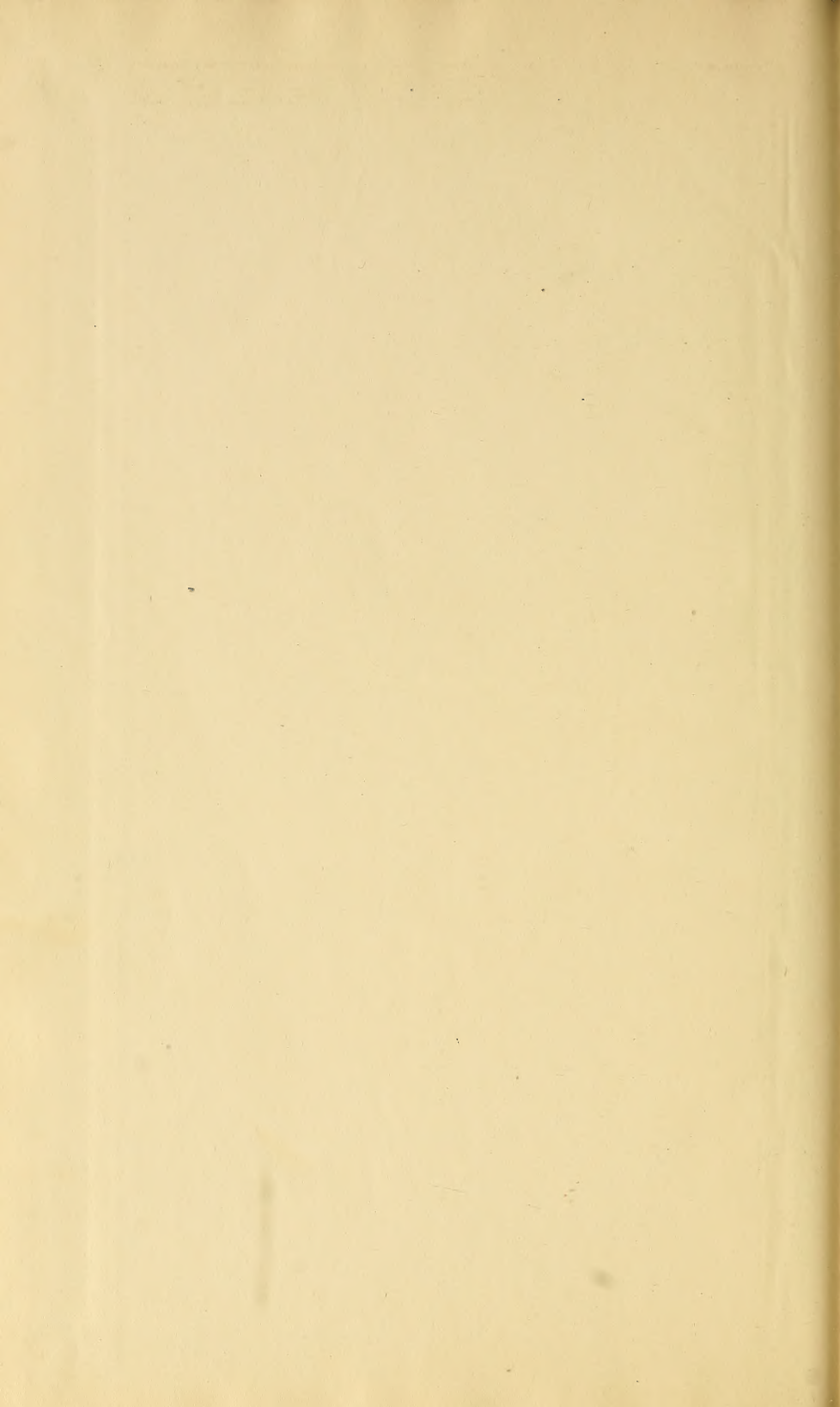
2/6



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